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COE & VAN LOO CONSULTANTS, INC.

CITY OF GOODYEAR - REPORT APPROVAL	
Darren Farar, PE	Date 1/15/2013
HTE# 12-1465	QS# 53 - 93

WEST GOODYEAR CENTRAL PLANNING AREA MASTER WASTEWATER STUDY UPDATE

December 11, 2012

Prepared for:
West Goodyear Owners Group

- Keith-Palm Canyon, L.L.C. (aka Las Palmas)
- Pacific Capital Meadows, L.L.C. (aka Amber Meadows)
- Citrus & Lower Buckeye, L.L.C. (aka LaJolla Vista)
- Pradera Partners 160, L.L.C. (aka Pradera)
- SUNBELT Holding, Inc. (aka La Privada)
- Taylor Morrison, Inc. (aka Las Brisas Phase 2c)

Prepared by:

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Registered Professional Engineer (Civil) — Certificate No. 14478 — Eric Laurin — Date Signed: 13 Dec. 12 — Arizona, U.S.A. — Expires: 6/30/15

CVL Project No.: 1.07.0112705

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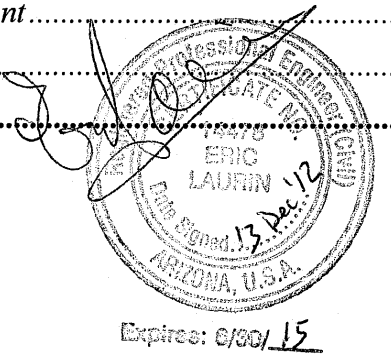


TABLES

FIGURES

1.0 INTRODUCTION

1.1 General Description

In 2005 an association of 16 West Goodyear property owners formed a group known as the Initial Development Group (IDG) to develop a plan to solve water and sewer service issues in the area of the City of Goodyear (COG) known as the West Goodyear Central Planning Area (WGCPA), which may be described in the area of the COG bordered by I-10 on the north, Perryville Road on the west, MC 85 on the south and Cotton Lane on the east. To that end, the IDG negotiated a Memorandum of Understanding (MOU) with COG that stipulated among other things that a master water and wastewater studies be performed to quantify the WGCPA's necessary infrastructure improvements and service capacity needs to satisfactorily provide water and sewer service to the WGCPA. The IDG retained Coe & Van Loo Consultants, Inc. (CVL) to prepare the required master water and wastewater study documents. The WGCPA Water and WGCPA Wastewater master studies were completed and approved by COG in July 2006.

The MOU also stipulated that each of the participating property owners within the IDG enter into a Development Agreement (the Agreement) with the COG. Each Agreement had a 5-year "Sunset" term at the end of which all provisions would expire unless plats were recorded and all agreed upon development fees paid to COG. With only 2 of the 16 IDG Properties having proceeded under the terms of their Agreement, letters from the COG began being received by the various members of the IDG on October 15, 2010, stating that COG planned to allow the Development Agreements to lapse. Six (6) of the remaining 14 IDG properties responded to the COG with applications for an amendment to their Development Agreements that would extend the Sunset provision of the Agreement by two years allowing time to renegotiate the terms of the Agreement and then have a new Agreement for these six (6) properties this matter heard and ruled on by COG City Council.

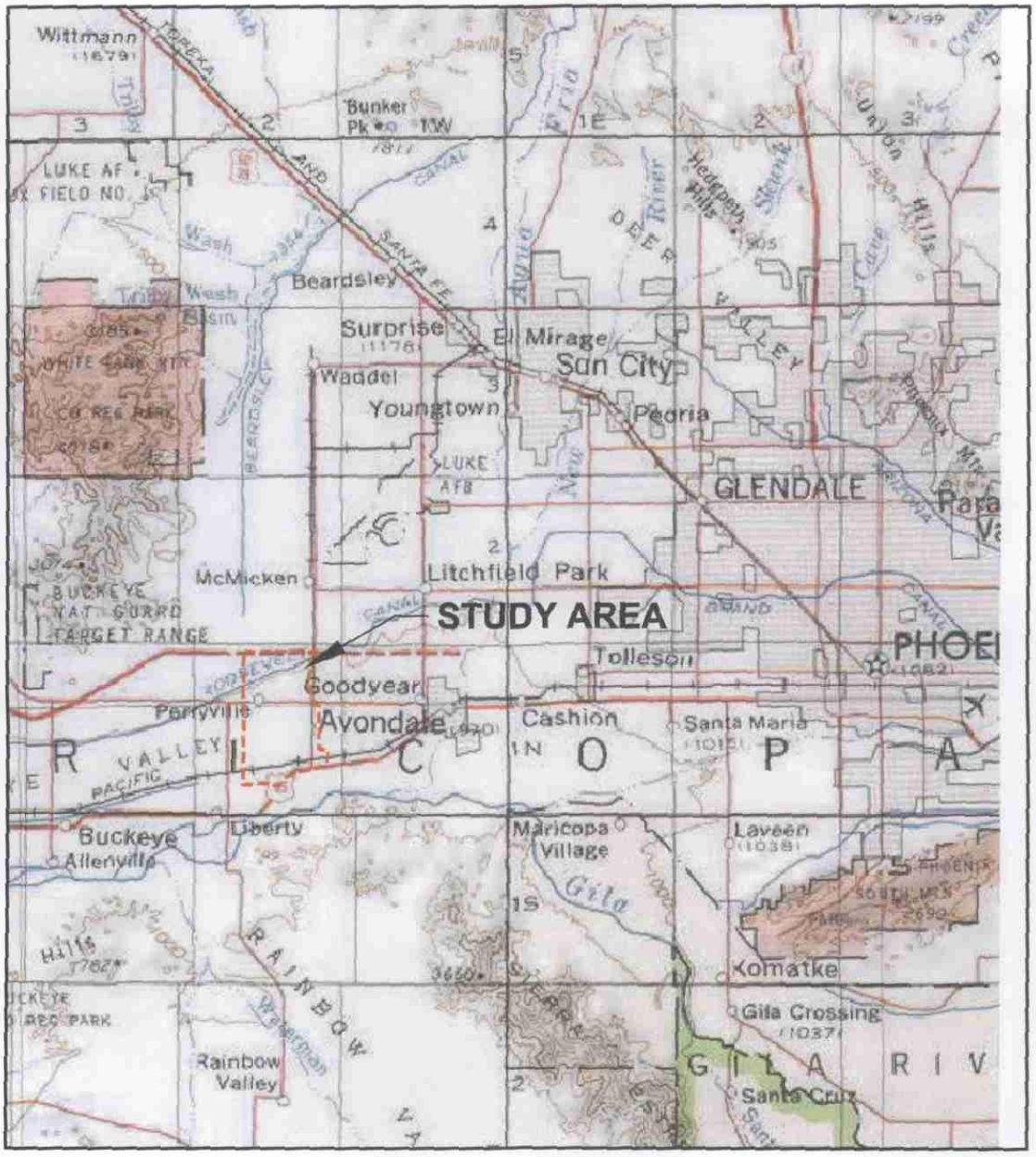
In December of 2011 the COG City Council approved Amendments for the six (6) responding IDG Members, which clarified the COG's position and indicated that the granting of a two-year extension would require that certain obligations be fulfilled by the five responding IDG Members including the preparation of new updated WGCPA Water and Wastewater Master Studies, which would reflect the findings of the COG's Integrated Water Master Plan (IWMP) and the recalculation of WGCPA's necessary Water and Wastewater infrastructure improvements and service capacity needs as well as cost allocation tables for the planned infrastructure improvements. The following report fulfills this requirement for the WGCPA Wastewater.

The wastewater system infrastructure needs of the WGCPA have been updated and are presented in this report. See Figure 1 for a WGCPA project vicinity map.

1.2 Scope of Work

The six (6) responding IDG Members retained CVL to complete an update to the previously completed Wastewater Master Plan as discussed above. This study determines what system improvements and service capacities are necessary to provide service to WGCPA properties not already served by existing COG facilities. This study has also recalculated the allocation of costs for these updated wastewater infrastructure facilities to the IDG properties as well as those other

WEST GOODYEAR CENTRAL PLANNING AREA



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VICINITY MAP	MASTER WASTEWATER STUDY	JOB NO 1.07.0112705
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	COE & VAN LOO PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	FIGURE 1

WGCPA properties not already served by existing COG wastewater infrastructure facilities. The cost allocation for the new wastewater infrastructure facilities is based on a proportional basis set forth in Section 3.2 of this report. The COG will administer a Cost Recovery Ordinance as a mechanism for the reimbursement to each developing WGCPA property though a City Council approved wastewater Cost Recovery Ordinance. See Section 3.2 and Tables 3-1, 3-2 for further information.

This report provides for the following tasks:

- Review latest IWMP criteria.
- Using the latest dwelling counts and land use plans obtained as part of the Water Master Study, calculate the expected ultimate average day and peak day flow discharges for the WGCPA.
- Using the planned sewer line alignments found in the IWMP, calculate the required pipeline diameters to transport projected sewage flows within the WGCPA to the existing COG interceptor system and 157th Avenue Water Reclamation Facility (WRF). CVL notes that portions of the WGCPA cannot be served by gravity and will require a lift station. This analysis will be performed on an Excel spreadsheet in which tributary areas, contributing flows, population served, sewer line sizes, and pipe flow characteristics will be identified for each segment of the study area.
- The location and size of the required lift stations will be determined using IWMP criteria.
- Prepare a new report that summarizes our findings for review and approval by COG. The report will contain the following discussion points:
  - Introduction.
  - Sewer System Analysis.
  - Connection to Existing Facilities.
    - Interceptors.
    - 157th Avenue WRF and capacity requirements.
  - Cost Analysis and Allocation to the service area properties identified in this report have been updated and reflect the latest findings of this report. See Section 3.3.3 for an in-depth discussion.
  - Summary and Conclusions.
  - All necessary tables, figures and background information to adequately describe the findings will also be included in the report.

1.3 Location

The WGCPA wastewater service area is approximately 6,450 acres and is bounded on the north by the Interstate-10 (I-10), 1/2 mile east of Cotton Lane on the east, on the west by Perryville Road and on the south by the MC 85, and includes portions of sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, and 27 of Township 1 North, Range 2 West of the Gila and Salt River base and Meridian, Maricopa County, Arizona. It is contained within a larger area established by the IWMP for this area of the City that extends south of Broadway Road to the Gila River, between Perryville Road and the approximate alignment of 155th Avenue as shown in Figure 15 of the

IWMP. The total area encompassed by the WGCPA and the IWMP extension is approximately 9,300 acres. See Figure 2.

1.4 Land Use and Population

The City of Goodyear Land Use Plan for 2012 was used to generate the wastewater flows for the WGCPA (See Appendix A) and for those areas of WGCPA not part of the IDG but within the study area. Input from the COG Engineering and Planning Departments was obtained in several meetings held in January and February 2012 to clarify the intent of the Land Use Plan and obtain guidance in assigning a land use designation to County Islands located within the study area. The area consists mostly of single-family residential with industrial and commercial properties designated in the northern and southern portions of the study area. A breakdown of land use and dwelling unit densities is presented in Figure 3 for IDG lands and additional development properties. Wastewater discharges for the study area are based on dwelling units and acreage and not per capita use, therefore, no population projections were made.

The IWMP land uses and expected wastewater discharges for those areas outside of the study area south of the southern limits of the study area and the Gila River were obtained from the IWMP.

1.5 Topographic Conditions

The WGPA Sewer Trunk Line Study Area consists of approximately 6,500 acres of a blend of undeveloped land used primarily for agriculture, and residential, commercial and industrial uses, the area slopes to a south to southeast direction. The total elevation change is approximately 157 feet, dropping from 1,045 feet above mean sea level (MSL) at Interstate 10 and Perryville Road to 890 feet above MSL at the Buckeye Canal. Elevations at the Gila River and Perryville Road are approximately 885 feet MSL.

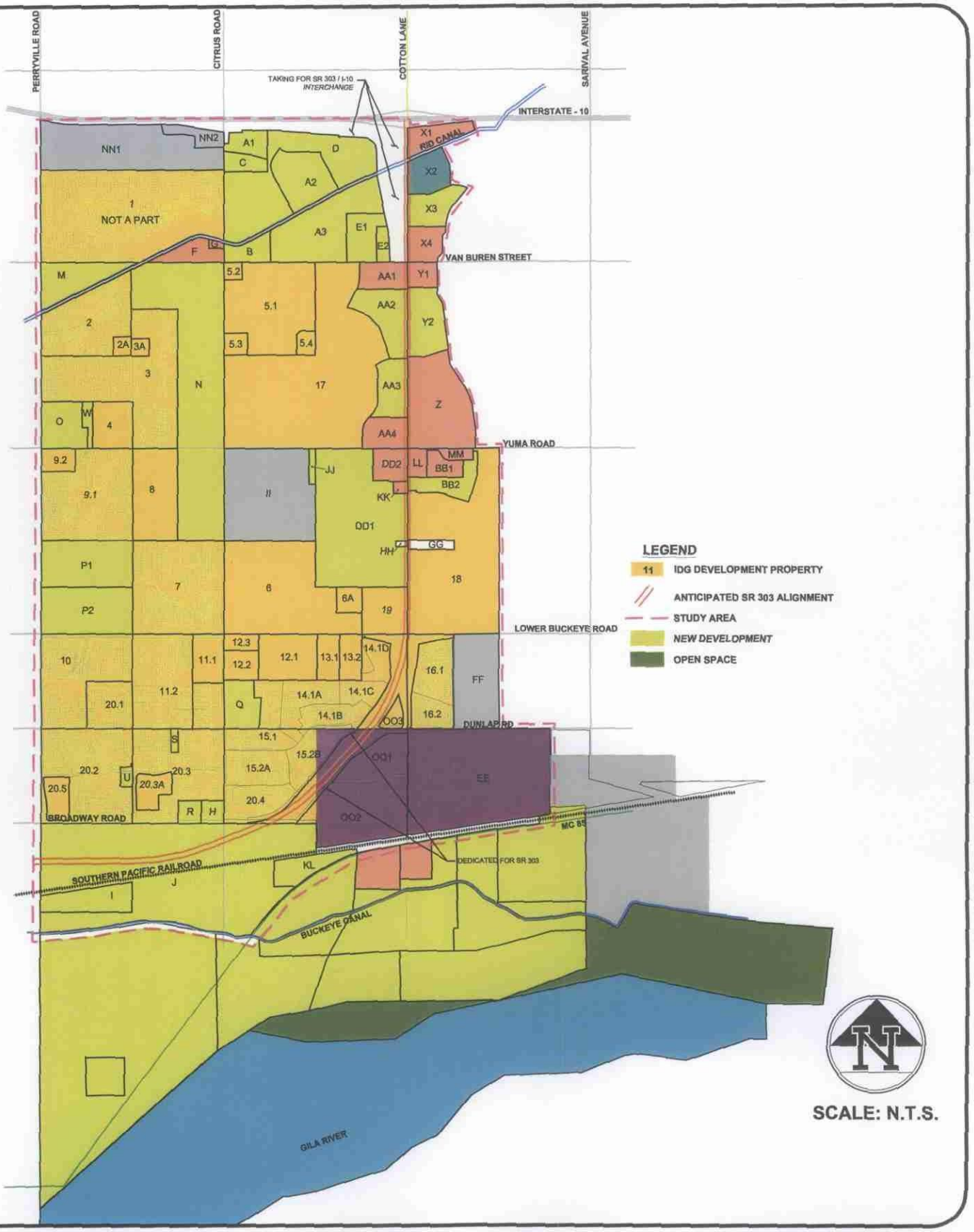
Major topographic features include I-10 along the north boundary of the study area, the Roosevelt Irrigation District (RID) Canal bisecting Sections 2, 3, the Buckeye Canal through Sections 26 and 27, and the Southern Pacific Railroad just south of Broadway Road. Cotton Lane is the proposed alignment for a future limited access roadway (Loop 303) from I-10 to Lower Buckeye with the proposed freeway sweeping southwest, then west, to Perryville approximately parallel to the UPRR.

1.6 Existing Wastewater Facilities

Significant improvements to the collection system have been made since the completion of the 2006 study. Major interceptors have been installed in the Elwood/Dunlap alignment; in Cotton Lane, from Dunlap to Yuma, and in other arterial streets and within residential developments as shown in Figure 4. A distinction is made between sewer lines installed by IDG participating properties as part of the 2006 Cost Recovery Analysis (CRO) and sewers installed by the COG or others.

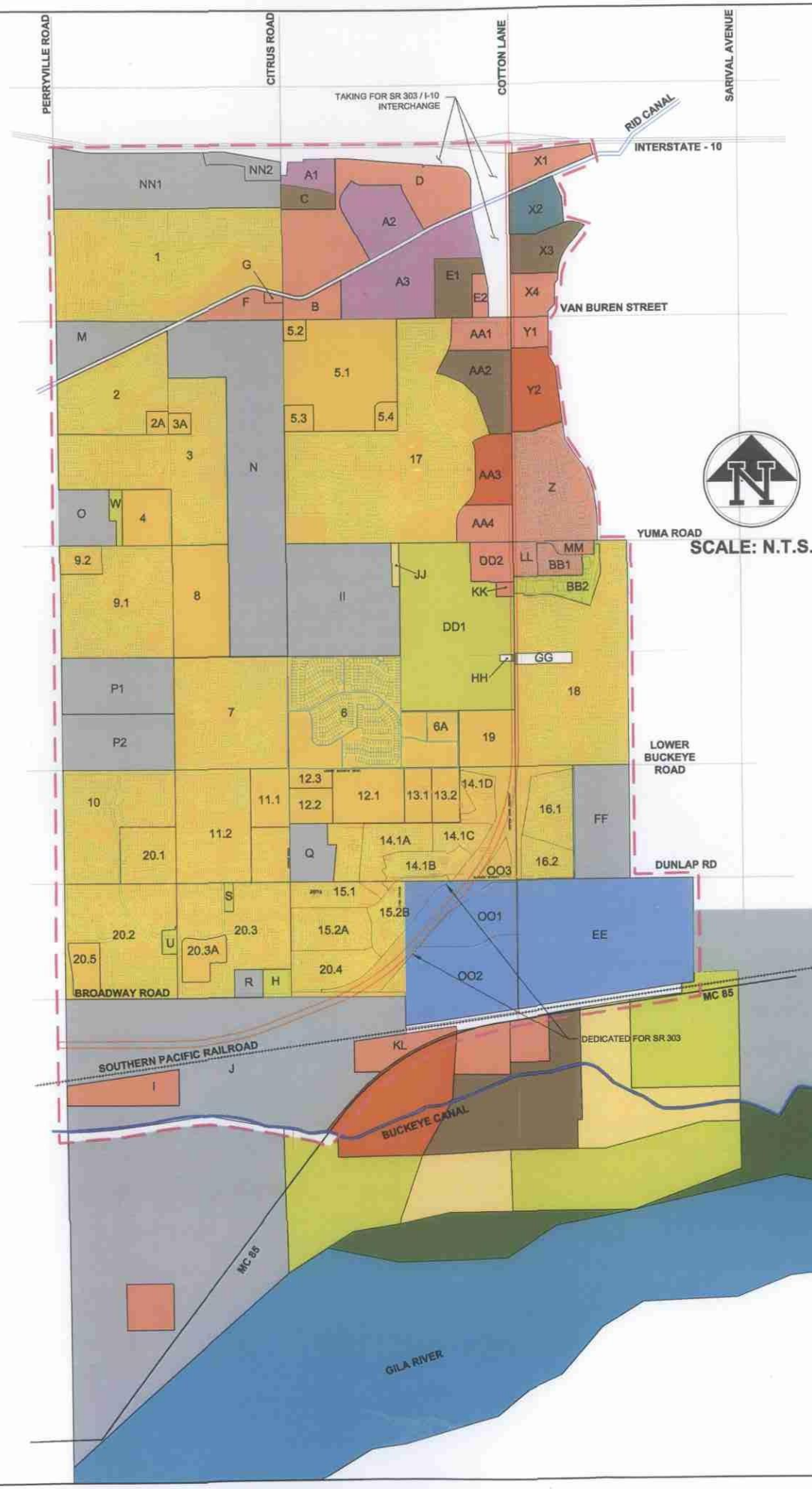
The Rubbermaid plant is sewered through a system of gravity sewers and two small wastewater lift stations located just north and parallel to the Southern Pacific Railroad. A lift station was installed in 2008 at Broadway Avenue and the 181st Avenue alignment as part of the Las Brisas development. The lift station capacity is approximately 1,243 gpm for Phase 1 and 2,100 gpm

for ultimate conditions. A parallel 8-inch/10-inch force main transports the pumped flows to a manhole located approximately one-quarter mile west of Cotton Lane on Dunlap/Elwood Road. The lift station is currently off-line and the equipment mothballed.



N:\07\0112705\Enviro\CADD\Goodyear Main\Master Wastewater Study Location Map-Figure2.dwg Breanna Dec 12, 2012 - 2:36pm

LOCATION MAP	**MASTER WASTEWATER STUDY**	JOB NO 1.07.0112705
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	**COE & VAN LOO** PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	FIGURE 2



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Area ID	IDG Development Group Properties	Land Use	Area (acres)	Units	Density (du/ac)	Unit Flow (gpud)	Unit Flow (gpad)	Average Flows (gpd)
1	Las Palmas	Single Family	273	750	2.75	144	-	108,000
2	Amber Meadows	Single Family	102	293	2.87	144	-	42,192
2A	Amber Meadows School	School	6	-	-	-	1019	6,114
3	La Privada	Single Family	194	569	2.93	144	-	81,936
3A	La Privada School	School	6	-	-	-	1019	6,114
4	Paseo Ridge Phase II	Single Family	40	114	2.85	144	-	16,416
5.1	Silva-Rose Gardens	Single Family	135	384	2.84	144	-	55,296
5.2	Silva-Rose	Commercial Pad	7	-	-	-	951	6,657
5.3	Silva-Rose Gardens	City Water &Fire Campus	10	-	-	-	1019	10,190
5.4	Silva-Rose Gardens	Charter School	8	-	-	-	1019	8,152
6	La Jolla Vista	Single Family	188	690	3.67	144	-	99,360
6A	La Jolla Vista School	School	12	-	-	-	1019	12,228
7	Pradera	Single Family	160	456	2.85	144	-	65,664
8	Paseo Ridge Phase I	Single Family	80	214	2.68	144	-	30,816
9.1	las Ventanas Single Family	Single Family	145	413	2.85	144	-	59,472
9.2	las Ventanas	Commercial Pad	15	-	-	-	951	14,265
10	Las Brisas Phase I	Single Family	120	324	2.70	144	-	46,656
11.1	Levinson	Commercial Pad	27	-	-	-	951	25,677
11.2	Levinson	Single Family	133	422	3.17	144	-	60,768
12.1	Citrus Ridge	Agua Fria HS District	50	-	-	-	1019	50,950
12.2	Citrus Ridge (R1-6)	Single Family	19	90	4.81	144	-	12,960
12.3	Citrus Ridge (C2)	Commercial Pad	8	-	-	-	951	7,998
13.1	Cotton Commons (MHD)	Multi-Family	20	300	15.00	124	-	37,200
13.2	Cotton Commons (MD)	Multi-Family	20	160	8.00	128	-	20,480
14.1a	El Cidro Ranch	Single Family	38	130	3.43	144	-	18,720
14.1b	El Cidro Ranch	Single Family	28	105	3.81	144	-	15,120
14.1c	El Cidro Ranch	Single Family	18	55	3.00	144	-	7,920
14.1d	El Cidro Ranch	Multi Family	18	178	9.68	128	-	22,784
15.1	El Cidro Ranch	Single Family	48	164	3.41	144	-	23,616
15.2a	El Cidro Ranch	Single Family	42	161	3.79	144	-	23,184
15.2b	El Cidro Ranch	Single Family	39	159	4.11	129	-	20,511
16.1	El Cidro Ranch	Single Family	42	140	3.30	144	-	20,160
16.2	El Cidro Ranch	Single Family	24	94	3.96	144	-	13,536
17	Canyon Trails 4 West (Centex)	Single Family	310	1064	3.43	144	-	153,216
18	Canyon Trails 4 South (TM)	Single Family	255	717	2.81	144	-	103,248
19	Sin Lomas	Single Family	40	135	3.38	144	-	19,440
20.1	Las Brisas Phase 2	Single Family	40	111	2.78	144	-	15,984
20.2	Las Brisas Phase 2	Single Family	150	416	2.78	144	-	59,968
20.3	Las Brisas Phase 2	Single Family	131	364	2.78	144	-	52,372
20.3 A	Las Brisas Phase 2 School	School	17	-	-	-	1019	16,915
20.4	El Cidro Ranch	Single Family	38	158	4.19	129	-	20,382
20.5	Las Brisas Phase 2	Commercial Pad	19	-	-	-	951	18,259
Sub Total			3,075	9,330				1,510,897

AVERAGE DAILY FLOW (ADD) = 3.65 MGD

MAX DAY FLOW (ADD X 2.89) = 10.54 MGD

LEGEND

11	IDG DEVELOPMENT PROPERTY	
LDR	LOW DENSITY RESIDENTIAL	LI LIGHT INDUSTRIAL
L-MDR	LOW-MEDIUM DENSITY RESIDENTIAL	GI GENERAL INDUSTRIAL
MDR	MEDIUM DENSITY RESIDENTIAL	OS OPEN SPACE
M-HDR	MEDIUM-HIGH DENSITY RESIDENTIAL	COUNTY
HDR	HIGH DENSITY RESIDENTIAL	ANTICIPATED SR 303 ALIGNMENT
CC	COMMUNITY COMMERCIAL	STUDY AREA

Area (ID)	Additional Development Properties	Land Use	Area (acres)	Units	Density (du/ac)	Unit Flow (gpud)	Unit Flow (gpad)	Average Flows (gpd)
A1	-	Light Industrial	10	-	-	-	815	8,150
A2	-	Light Industrial	50				815	40,750
A3	-	Light Industrial	72				815	58,346
B	-	Community Commercial	20	-	-	-	951	19,020
C	-	M-HDR Multi-Family	10	150	15	124	-	18,600
D	-	Community Commercial	116	-	-	-	951	110,316
E1	-	M-HDR Multi-Family	20	300	15	124	-	37,200
E2	-	Community Commercial	5	-	-	-	951	4,755
F	-	Community Commercial	20	-	-	-	951	19,020
G	-	Community Commercial	2	-	-	-	951	1,902
H	-	LDR	10	30	3	144	-	4,320
I	-	Community Commercial	40	-	-	-	951	38,040
J	-	County Land-Light Industrial	370	-	-	-	815	301,550
K	-	Community Commercial	20	-	-	-	951	19,020
L	-	Community Commercial	7	-	-	-	951	6,657
M	-	County Land-RR	45	45	1	160	-	7,200
N	-	County Land-RR	250	250	1	160	-	40,000
O	-	County Land-LDR	30	90	3	144	-	12,960
P1	-	County Land-LDR	75	225	3	144	-	32,400
P2	-	County Land-RR	75	75	1	160	-	12,000
Q	-	County Land-LDR	30	90	3	144	-	12,960
R	-	County Land-LDR	10	30	3	144	-	4,320
S	-	LDR	3	9	3	144	-	1,296
U	-	LDR	5	15	3	144	-	2,160
W	-	LDR	7	21	3	144	-	3,024
X1	-	Community Commercial	26	-	-	-	951	24,726
X2	-	HDR Multi-Family	30	750	25	110	-	82,500
X3	-	M-HDR Multi-Family	31	465	15	124	-	57,660
X4	-	Community Commercial	23	-	-	-	951	21,873
Y1	-	Community Commercial	14	-	-	-	951	13,314
Y2	-	MDR Multi-Family	46	368	8	128	-	47,104
Z	-	Community Commercial	104	-	-	-	951	98,904
AA1	-	Community Commercial	24	-	-	-	951	22,824
AA2	-	M-HDR Multi-Family	47	705	15	124	-	87,420
AA3	-	MDR Multi-Family	33	264	8	128	-	33,792
AA4	-	Community Commercial	26	-	-	-	951	24,726
BB1	-	Community Commercial	14	-	-	-	951	13,314
BB2	-	LDR	27	81	3	144	-	11,664
DD1	-	LDR	214	642	3	144	-	92,448
DD2	-	Community Commercial	21	-	-	-	951	19,971
EE	-	General Industrial	258	-	-	-	1087	280,446
FF	-	County Land-RR	80	80	1	160	-	12,800
GG	-	Open Space	8	0	0	0	0	0
HH	-	Open Space	1	0	0	0	0	0
II	-	County Land-RR	155	155	1	160	-	24,800
JJ	-	L-MDR SingleFamily	4	20	5	129	-	2,580
KK	-	Community Commercial	3	-	-	-	951	2,853
LL	-	Community Commercial	10	-	-	-	951	9,510
MM	-	Community Commercial	7	-	-	-	951	6,657
NN1	-	County Land-Community Commercial	141	-	-	-	951	134,091
NN2	-	County Land-Light Industrial	13	-	-	-	815	10,391
OO1	-	General Industrial	50	-	-	-	1087	53,817
OO2	-	General Industrial	114	-	-	-	1087	123,375
OO3	-	Community Commercial	8				951	7,817
Sub Total			2,833	4,860				2,137,343
Grand Total of Service Area			5,908	14,190				3,648,240

WEST GOODYEAR
CENTRAL PLANNING AREA

WASTEWATER STUDY AREA - LAND USE

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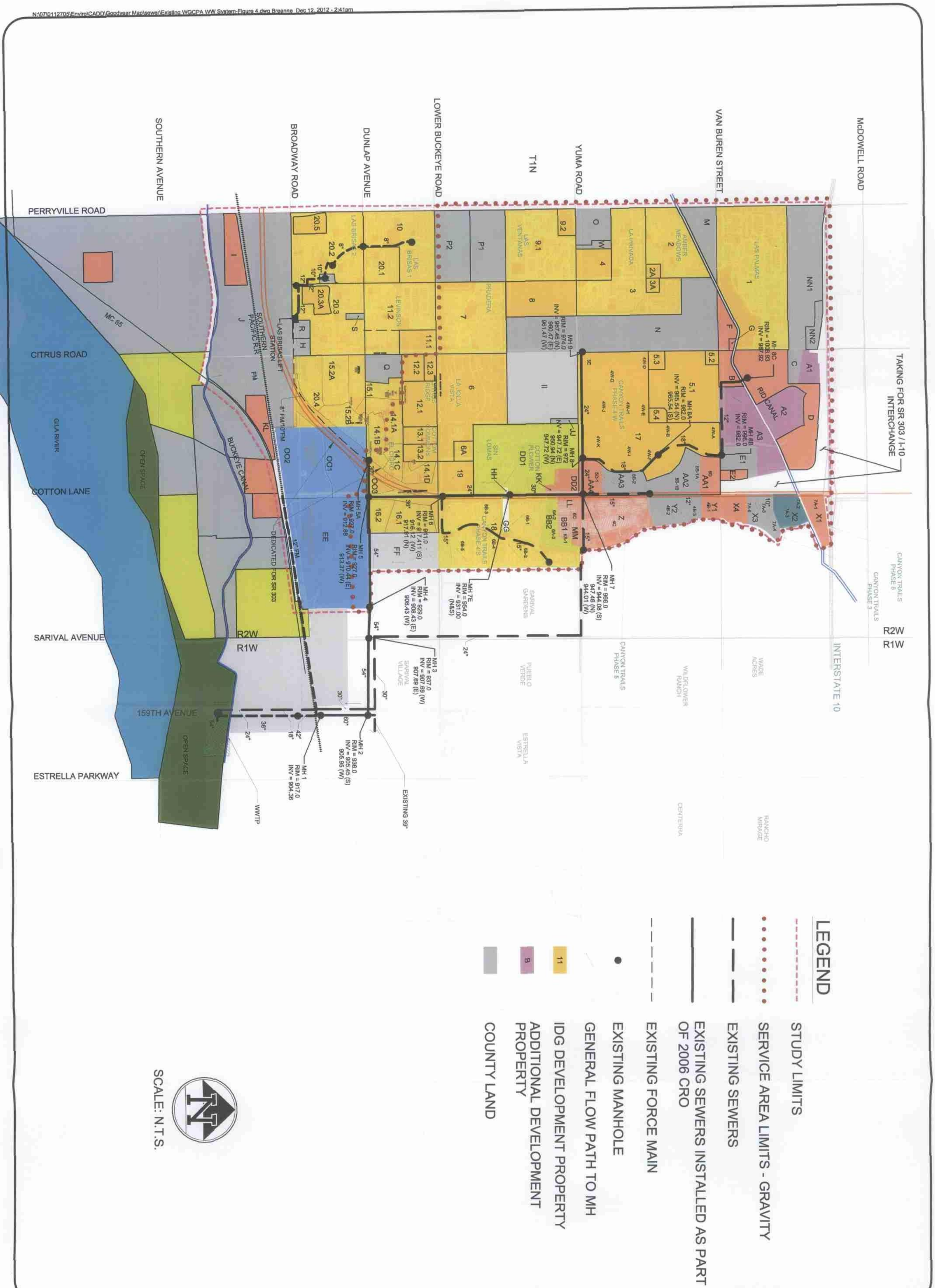
FIGURE
3



JOB NO 1.07.0112705	EXISTING WEST GOODYEAR CENTRAL PLANNING AREA WASTEWATER SYSTEM
FIGURE 4	4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831

WEST GOODYEAR CENTRAL PLANNING AREA

COE & VAN LOO

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2.0 ANALYSIS

2.1 General

The existing sewer system will be expanded in the future as development occurs. The template established in the 2006 study has been updated and line sizes for planned sewers modified as necessary to reflect the latest land use plan and anticipated flows calculated using current unit factors. The sewer system presented in this plan was developed to serve existing and proposed developments in the WGCP Sewer Trunk Line Study Area. The study area has been subdivided into an area that can be accommodated by gravity sewers and smaller areas that may require a lift station (see Figure 4). All flows would be treated at the City's Wastewater Reclamation Facility (WWRF) located at 157th Avenue and the Buckeye Canal.

2.2 Wastewater System Design Criteria

The design in this wastewater master plan was based on criteria in the City of Goodyear's *Engineering Design Standards and Policies Manual.* The following criteria were used in developing this plan:

- Slopes shall, in 10-inch or smaller sewer lines, have a minimum velocity of 2 feet per second using Manning's equation, with an n-value of 0.013. For sewer lines larger than 10-inch, maintain velocities of 2.5 fps. See Table 6.3-1 in Engineering Design Manual.

- Terminal manholes within developments were assumed to have a minimum depth of 8 feet.

- Sewer lines with diameters of 8 to 12 inches were designed with a peak capacity of 400 gallons per capita per day flowing full.

- Sewer lines with diameters greater than 12 inches were designed using the criteria identified in the City's IWMP using generation rates listed in Table 1:

  Maximum daily flows were calculated using a peaking factor of 2.89.

  CVL notes that the COG has linked the wastewater generation rates to the water demand criteria. Wastewater generated for each land use is given as a percentage of water demanded for that land use. As an example, the unit water demand for a low density (2-4 du/ac) residential land use is 351 gal/day-unit; the wastewater unit rate is given as being 41 percent of the unit water demand or 144 gal/day-unit. This is the flow to be returned to the WWRF as sewage. The other 59 percent is lost through irrigation or other consumptive uses. These rates are also listed in Table 3-12 in the IWMP.

- The dwelling unit density for each tributary parcel was obtained from the general plan, from available lotting information or from input from the COG Planning Department. Also the General Plan was used to identify commercial and industrial parcels.

- For dissimilar sewer sizes, a crown-to-crown tie in was assumed.

- The proposed gravity system is to be connected to the existing sewers previously installed. All flows will be treated at the 157th Avenue WWRF.

- Areas tributary to lift stations will be served by the extension or installation of a collection system. Lift station pumping requirements may be phased to meet initial and ultimate flows as presented in wastewater master studies performed for individual parcels by the developer of the parcel. All flows will be treated at the 157th Avenue WWRF.

- All lift stations will be designed to be compatible with the City of Goodyear SCADA system.

2.3 Sewer System Analysis

2.3.1 Sewer System Description

The area slopes generally to the south and southeast. The sewer system flows by gravity and is designed to take advantage of the topographic conditions. The sewer system, therefore, was designed to flow to the south and southeast to take advantage of the natural slope of the land and avoid unnecessarily deep sewers. Most of the main sewer lines are in the major streets.

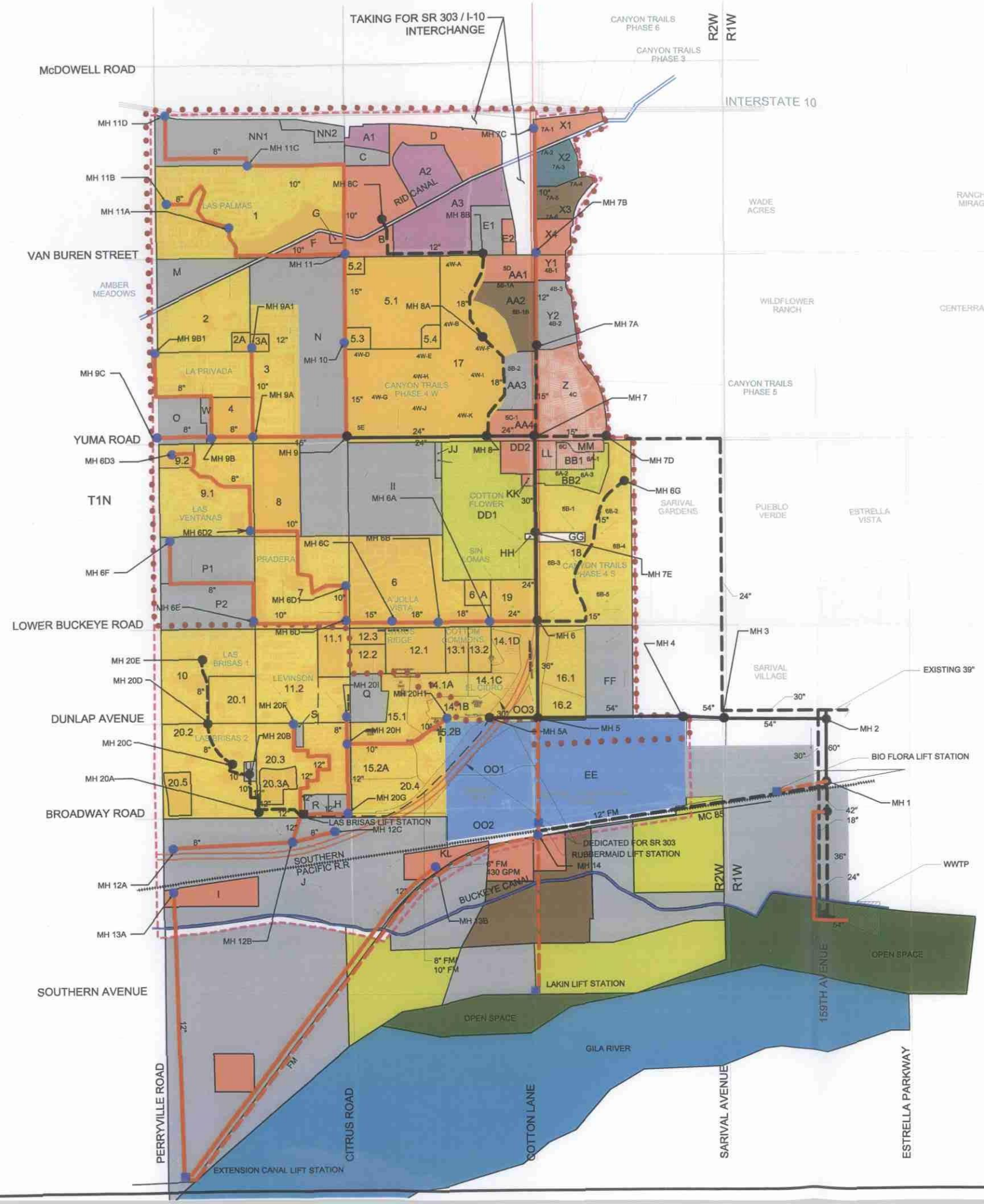
Presented in Figure 5 is the proposed sewer system for the area at ultimate build out. Line sizes are shown next to the proposed sewer line segments. Nodes are numbered and separate sewers of different line sizes. Subareas are shown and an arrow within each area indicates the sewer line that will receive the majority of flow from the area. Proposed sewer lines range in size from eight inches to 18 inches.

The area generally south of the SPRR will be served by four lift stations as shown in Figure 5, taken from the IWMP Figure 15 – Build Out 157th Avenue Basin (2007). Line sizes, lift station capacity, and force main locations were also taken directly from the IWMP.

The land use and areas for those parcels contributing flow to each reach of sewer line was tabulated and wastewater flows were calculated using the previously mentioned criteria. The flow data is summarized on Tables 2a-2c for ultimate conditions. Estimated invert elevations for each node are shown and the estimated depth for each upstream node is also presented. The line size and estimated length for each reach of sewer line is also shown. Land uses were taken from Figure 3.

2.3.2 Sewer Line Analysis

Sewer lines were sized as follows. The area tributary to the sewer was established using the existing topography. Flows were then calculated using the appropriate land use factors shown in Table 1. The smallest size sewer line was then selected that had the capacity to carry the calculated flow. The design of individual project or community sewer systems within each property's development will be performed in a wastewater master plan document to be submitted by a developer as required by the City of Goodyear. Therefore, sewer line sizing design for this study followed the criteria outlined in Section 2.2, items 3) and 4) above.



LEGEND

- STUDY LIMITS
- SERVICE AREA LIMITS - GRAVITY
- EXISTING SEWERS
- EXISTING SEWERS INSTALLED AS PART OF 2006 CRO
- PROPOSED SEWERS
- EXISTING FORCE MAIN
- PROPOSED FORCE MAIN
- PROPOSED MANHOLE
- EXISTING MANHOLE
- GENERAL FLOW PATH TO MH
- EXISTING LIFT STATION
- PROPOSED LIFT STATION
- 11 — IDG DEVELOPMENT PROPERTY
- B — ADDITIONAL DEVELOPMENT PROPERTY
- COUNTY LAND

SCALE: N.T.S.

WEST GOODYEAR CENTRAL PLANNING AREA

PROPOSED WASTEWATER SYSTEM

COE & VAN LOO
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4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

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FIGURE
5

Table 1 – Wastewater Unit Rates

Land Use	Wastewater Unit Rates
Single-Family Residential	
Rural (0-2 DU/Ac)	160 gpd/DU
Low Density (2-4 DU/Ac)	144 gpd/DU
Low-Medium Density (4-6 DU/Ac)	129 gpd/DU
Multi-Family Residential	
Medium Density (6-10 DU/Ac)	128 gpd/DU
Medium-High Density (10-20 DU/Ac)	124 gpd/DU
High Density (20+ DU/Ac)	110 gpd/DU
Industrial/Commercial	
Light Industrial	815 gpd/Ac
Community Commercial	951 gpd/Ac
General Industrial	1,087 gpd/Ac
Other	
Public/Quasi Public (School)	1,019 gpd/Ac

Each branch of the collection system was analyzed beginning with the upstream areas and continuing downstream to the major collector lines. The invert of each node was calculated using the slope necessary to achieve the minimum velocity. Inverts were then checked to determine if the depth was sufficient to meet the minimum cover requirements.

2.3.3 Wastewater Flows

Using the unit factor shown in Table 1, CVL calculated the flows anticipated from the WGCPA. See Table 2a for IDG properties, Table 2b for additional development properties and Table 2c for a summary of both.

Table 2a – Wastewater Generated Flows, IDG Properties

Area ID	Property	DU's	Unit Flow (gpud)	Unit Flow (gpad)	Average Flows (gpd)	Peak Flows (gpd)
1	Las Palmas	750	144		108,000	312,120
2	Amber Meadows	293	144		42,192	121,935
2A	Amber Meadows School			1,019	6,114	17,669
3	La Privada	569	144		81,936	236,795
3A	La Privada School			1,019	6,114	17,669
4	Lees	114	144		16,416	47,442
5	Silva-Rose Gardens	384	144	951/1019	80,295	232,053
6	La Jolla Vista	690	144		99,360	287,150
6A	La Jolla Vista School	-	-	1,019	12,228	35,339
7	Pradera	456	144		65,664	189,769
8	Van Leeuwen	214	144		30,816	89,058
9	Las Ventanas Single Family	413	144	951	73,737	213,100
10	Las Brisas Phs 1	324	144		46,656	134,836
11	Levinson	422	144	951	86,445	249,826
12	Citrus Ridge (R1-6)	90	144	951/1019	71,908	207,814
13	Cotton Commons (MD/MHD)	460	124/128		57,680	166,695
14	El Cidro Ranch	468	128/144		64,544	186,532
15	El Cidro Ranch	484	129/144		67,311	194,529
16	El Cidro Ranch	234	144		33,696	97,381
17	Canyon Trails 4 West (Centex)	1,064	144		153,216	442,794
18	Canyon Trails 4 South (TM)	717	144		103,248	298,387
19	Sin Lomas	135	144		19,440	56,182
20	Las Brisas 2/El Cidro Ranch	1,049	129/144	951	166,966	482,532
	Las Brisas 2 School	-	-	1,019	16,915	48,886
	GRAND TOTAL				**1,510,897**	**4,366,493**

Table 2b – Wastewater Generated Flows by Land Use, Other Properties

Area ID	Land Use	DU	Unit Flow (gpud)	Unit Flow (gpad)	Average Flows (gpd)	Peak Flows (gpd)
C	M-HDR	150	124		18,600	53,754
E1	M-HDR	300	124		37,200	107,508
H	LDR	30	144		4,320	12,485
M	County Land-RR	45	160		7,200	20,808
N	County Land-RR	250	160		40,000	115,600
O	County Land-LDR	90	144		12,960	37,454
P1	County Land-LDR	225	144		32,400	93,636
P2	County Land-RR	75	160		12,000	34,680
Q	County Land-LDR	90	144		12,960	37,454
R	County Land-LDR	30	144		4,320	12,485
S	LDR	9	144		1,296	3,745
U	LDR	15	144		2,160	6,242
W	LDR	21	144		3,024	8,739
X2	HDR	750	110		82,500	238,425
X3	M-HDR	465	124		57,660	166,637
Y2	MDR	368	128		47,104	136,131
AA2	M-HDR	705	124		87,420	252,644
AA3	MDR	264	128		33,792	97,659
BB2	LDR	81	144		11,664	33,709
DD1	LDR	642	144		92,448	267,175
FF	County Land-RR	80	160		12,800	36,992
GG	Open Space	0	0		0	0
HH	Open Space	0	0		0	0
II	County Land-RR	155	160		24,800	71,672
JJ	L-MDR	20	129		2,580	7,456
	Subtotal Residential	**4860**			**641,208**	**1,853,090**
A1	Light Industrial			815	8,150	23,554
A2	Light Industrial			815	40,750	117,768
A3	Light Industrial			815	58,346	168,620
B	Community Commercial			951	19,020	54,968
D	Community Commercial			951	110,316	318,813
E2	Community Commercial			951	4,755	13,742
F	Community Commercial			951	19,020	54,968

Area ID	Land Use	DU	Unit Flow (gpud)	Unit Flow (gpad)	Average Flows (gpd)	Peak Flows (gpd)
G	Community Commercial			951	1,902	5,497
I	Community Commercial			951	38,040	109,936
J	County Land-Light Industrial			815	301,550	871,480
K	Community Commercial			951	19,020	54,968
L	Community Commercial			951	6,657	19,239
X1	Community Commercial			951	24,726	71,458
X4	Community Commercial			951	21,873	63,213
Y1	Community Commercial			951	13,314	38,477
Z	Community Commercial			951	98,904	285,833
AA1	Community Commercial			951	22,824	65,961
AA4	Community Commercial			951	24,726	71,458
BB1	Community Commercial			951	13,314	38,477
DD2	Community Commercial			951	19,971	57,716
EE	General Industrial			1,087	280,446	810,489
KK	Community Commercial			951	2,853	8,245
LL	Community Commercial			951	9,510	27,484
MM	Community Commercial			951	6,657	19,239
NN1	County Land-Community Commercial			951	134,091	387,523
NN2	County Land-Light Industrial			815	10,391	30,031
OO1	General Industrial			1,087	53,817	155,532
OO2	General Industrial			1,087	123,375	356,552
OO3	Community Commercial			951	7,817	22,592
	Subtotal Industrial/Commercial				**1,496,135**	**4,323,831**
	GRAND TOTAL				**2,137,343**	**6,176,922**

[1]RR Rural Residential (0-2 du/ac)
[2]LDR- Low Density Residential (2-4 du/ac)
[3]M-HDR Medium-High Density Residential (10-20 du/ac)

Table 2c – Total Wastewater Generated Flows in Study Area

Table	Land Use	DU's	Average Flows Residential (gpd)	Average Flows Commercial (gpd)	Total Average Flows (gpd)	Total Peak Flows (gpd)
2a	All	9,103	1,334,9810	123,889	1,510,897	4,366,493
2b	All	4,902	641,208	1,496,135	2,137,343	6,176,922
	TOTAL	**7,993**	**1,976,189**	**1,620,024**	**3,648,240**	**10,543,415**

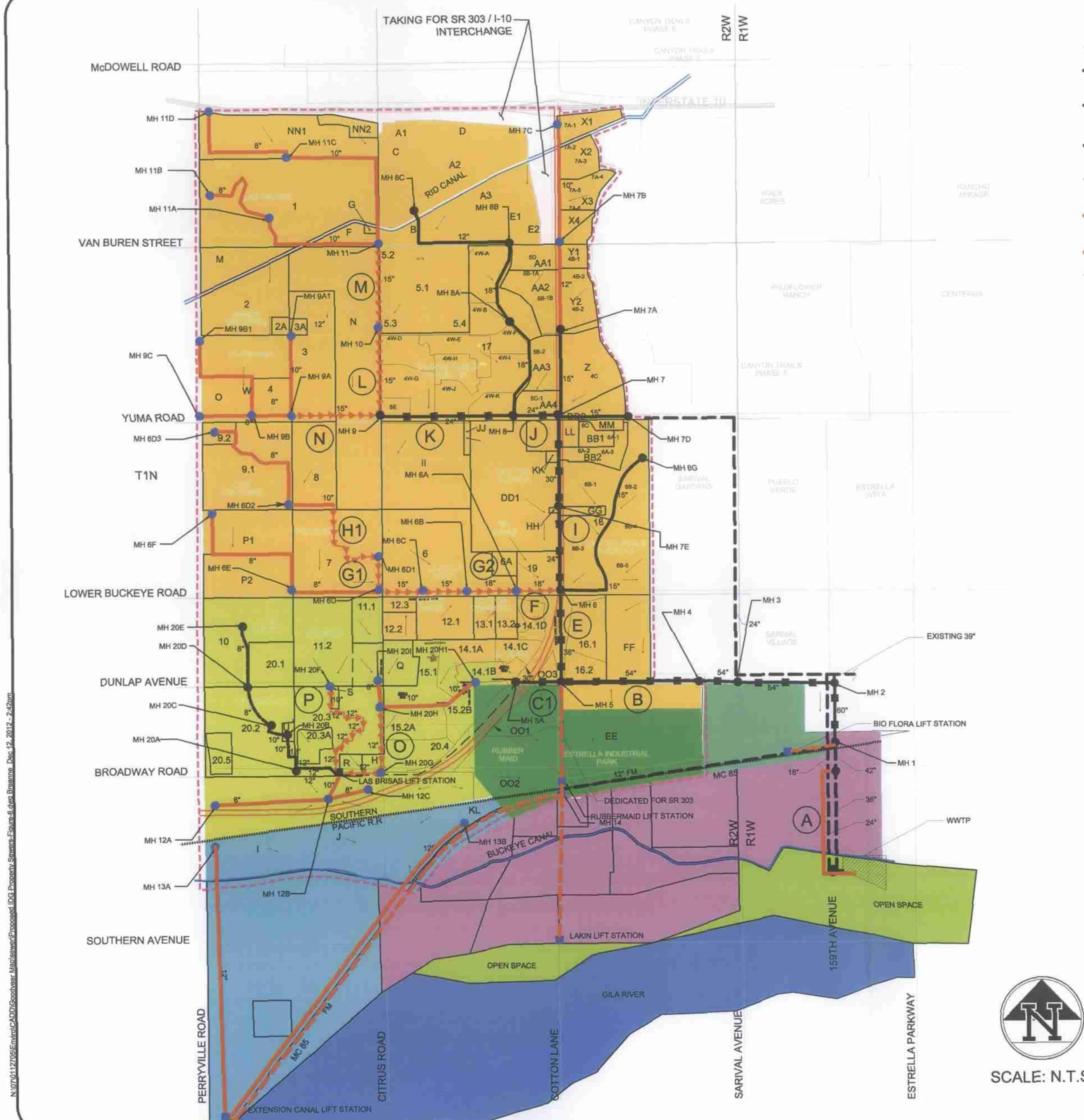
2.4 Discussion

Approximately 5,520 acres of the WGCPA study area may be served by gravity to the existing 54"/60" off-site sewer interceptor along the Dunlap Road/Elwood Ave alignment. The remaining area must be provided service through the Las Brisas Lift Station and Rubbermaid Lift Station. Areas south of the Southern Pacific Railroad will be served by three proposed lift stations described below and shown in the Figure 5 and 6 Buildout Collection System 157th Avenue Basin.

The Las Brisas lift station is located approximately 1,400 LF west of the intersection of Broadway and Citrus Roads. Its initial capacity is 1.79 MGD and has been designed for an ultimate capacity of 2.98 MGD in 2008 by Goodwin-Marshall as part of the mater planning of Las Brisas. Its tributary area is approximately 900 acres. This lift station was constructed as part of the Las Brisas development. A force main discharges pumped sewage to the existing 24-inch gravity interceptor in Dunlap/Elwood, at S 175th Avenue. This force main has been installed as a dry line from the proposed Las Brisas LS site to the reconnection point at 175th Avenue. It consists of an 8-inch and 10-inch pipeline. The City of Goodyear currently has a ROW reservation for the future Loop 303 alignment for the reach south of Lower Buckeye. The configuration of local streets will be impacted by this freeway if it sweeps west and south, parallel to the UPRR to Perryville. Final sewer alignments may vary from those shown in this report as the Loop 303 design progresses. Actual roadway construction is not anticipated until the 2015-2018 horizon.

A lift station will be required to service the low ground south of the SPRR, between Perryville and Cotton Lane. That area, including the 315 acre portion of the WGCPA study area, will drain by gravity to the proposed Extension Canal and Lakin lift stations and be pumped to the intersection of Cotton Lane and MC85 where it will discharge to the proposed Rubbermaid lift station. The proposed Extension Canal lift station is located at Baseline Road and Perryville Road and the proposed Lakin lift station is located north of Southern Avenue on Cotton Lane per the Black and Veach Integrated Master Plan Study, 2008.

The existing series of lift stations and force mains serving the former Rubbermaid parcel will be abandoned and a new lift station installed to pump collected wastewater to the existing 54 inch Interceptor at the intersection of Cotton Lane and Dunlap. Table 3 summarizes the pumping capacity required at buildout for each lift station described above. Data is derived from the 2008 IWMP as updated by information received from Goodwin & Marshall for the Las Brisas Lift Station. Any lift station required to provide service to the study area will be designed to be compatible with the City's SCADA system.



LEGEND

- STUDY LIMITS
- EXISTING SEWERS OUTSIDE SERVICE AREA
- EXISTING REGIONAL SEWER LINES FOR WGCPA (NOT PART OF ANY CRO)
- EXISTING SEWERS INSTALLED AS PART OF 2006 CRO
- EXISTING FM
- PROPOSED PROJECT SPECIFIC SEWERS (NON-REGIONAL)
- PROPOSED PROJECT SPECIFIC FORCE MAIN
- CRO REGIONAL SEWER LINES NOT YET BUILT
- PROPOSED MANHOLE
- EXISTING MANHOLE
- GENERAL FLOW PATH TO MH
- EXISTING LIFT STATION
- PROPOSED LIFT STATION
- LAS BRISAS LIFT STATION SERVICE AREA
- EXTENSION CANAL LIFT STATION SERVICE AREA
- RUBBERMAID LIFT STATION SERVICE AREA
- BIO FLORA LIFT STATION SERVICE AREA
- LAKIN LIFT STATION SERVICE AREA

REGIONAL SEWER TRUNK LINE LEGEND

- (A) 159TH AVE (BOTTLENECK) SEWER TRUNK LINE BY CITY
- (B) ELWOOD / 159TH LINE
- (C1) L303 / EL CIDRO LINE
- (E) SOUTH COTTON LINE
- (F) EAST LOWER BUCKEYE LINE
- (G1) CITRUS/LOWER BUCKEYE LINE
- (G2) LOWER BUCKEYE LINE
- (H1) NORTH CITRUS LINE
- (I) NORTH COTTON LINE
- (J) EAST YUMA LINE
- (K) WEST YUMA LINE
- (L) NORTH CITRUS LINE
- (M) NORTH CITRUS (LAS PALMAS) LINE
- (N) 183RD AVE. & YUMA
- (O) SOUTH CITRUS LINE
- (P) LAS BRISAS LINE

SCALE: N.T.S.

NOTE:
MANHOLES SHOWN ARE FOR MASTER PLANNING PURPOSES. FINAL ENGINEERING DESIGN PLANS WILL BE REQUIRED TO PROVIDE MANHOLES SPACED PER CITY STANDARDS.

WEST GOODYEAR
CENTRAL PLANNING AREA - 2012

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

PROPOSED IDG PROPERTY SEWERS

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

JOB NO
1.07.0112705
FIGURE
6

N:\07\0112705\Enviro\CADD\Goodyear Map\sewer\Proposed IDG Property Sewers-Figure-6.dwg Breanne Dec 12, 2012 - 2:42pm

Table 3 – Lift Station Capacity Summary

Lift Station	Current Capacity	IWMP[2] Ultimate Peak Flows (2008)	Firm Capacity	Proposed Ultimate Firm Capacity
Lakin	-	2.47 MGD	2.5 MGD[2]	2.5 MGD
Extension Canal	-	1.36 MGD	1.36 MGD[2]	1.36 MGD
Las Brisas	1.79 MGD[1]	0.57 MGD	2.58 MGD[1]	2.98 MGD
Rubbermaid	0.12 MGD[2]	0.56 MGD	0.55 MGD[2]	4.41 MGD[3]
Bio Flora	0.21 MGD[2]	0.47 MGD	0.46 MGD[2]	0.46 MGD

[1] Capacity per Goodwin Marshall 2006 Las Brisas Lift Station Design Report, Section 1.1
[2] Capacity per IWMP, Table 13, Tech Memorandum No. 2-2.
[3] Sum of tributary LSs: Extension Canal, Lakin, plus Rubbermaid LS.

The Proposed Ultimate Firm pumping capacities for the lift stations were taken from the IWMP with the exception of the Rubbermaid Lift Station for which the contributing areas and tributary lift station capacities were added together. The Las Brisas Lift Station ultimate capacities were taken from the Goodwin & Marshall design report.

2.5 Proposed Wastewater Collection System

The four (4) page Table 4 presents the proposed wastewater flows in each section of the sewer collection system within the WGCPA study area. It includes both existing and proposed sewers. The inverts shown meet the criteria for minimum velocity and flow depth. Figure 5 depicts the proposed ultimate wastewater system.

The areas south of the Southern Pacific Railroad to the Gila River are shown schematically in Figures 5 and 6 as taken from the IWMP. Detailed collection system routing and flow-capacity calculations for individual pipes was not performed for these areas outside of the WGCPA study limits.

The Table 4 flows include wastewater from contributing areas south of MC 85/UPRR corridor to the Gila River. These areas, although outside the WGCPA, will discharge collected sewage to the Elwood Interceptor at Cotton Lane and Dunlap Road through a series of cascading lift stations. See Figure 6.

CVL notes that the peak lift station discharges from the Las Brisas, Extension Canal, Lakin, Rubbermaid, and Bio Flora Lift Station facilities were taken from Table 3 as new proposed firm capacity. Although pumped flows are expected to attenuate during system operation, CVL assumed that the flow contribution from each lift station would remain at the rated firm capacity and routed through the interceptor sewers.

Sewer alignments shown were developed from best available information. Should easements be required for any of the sewers depicted, acquisition may be necessary by the development for these lines.

2.6 Treatment Capacity Requirements

All flows within the WGCPA study limits and those areas south of the Southern Pacific Railroad to the Gila River will be collected and treated at the existing 157th Avenue WWRF (treatment plant) owned and operated by the City of Goodyear. The anticipated ultimate flows to the treatment plant from the WGCPA study area shown in Tables 2a, b, and c are duplicated below:

Wastewater Flows, IDG Properties	1,475,723 gpd
Wastewater Flows, Other Properties	2,137,343 gpd
Total	3,613,066 gpd

The existing permitted treatment capacity of the treatment plant is 4.0 MGD. Recent discussions with City Operating Staff have determined that current inflows to the treatment plant are consistently 3.1 to 3.2 MGD. CVL has been informed that the facility's inflows have reached 80 percent of design capacity thereby triggering a notice from the Maricopa County Environmental Service Department (MCESD) directing the City to begin studies to increase the treatment capacity of the facility.

Table 4: Ultimate Sewer System

Start MH	End MH	Area ID	Average Flow (gpd)	Cumulative Average Flow (gpd)	Peaking Factor	Total Estimated Peak Flow (gpd)	Estimated Ground Elevation (feet)	Estimated Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Estimated Start Depth (feet)	Estimated Start Invert Elevation (ft)	Mid-line Bend Drops (ft)	Estimated End Invert Elevation (ft)	Sewer Line Capacity (gpd)	% Full (Q/Q_f)	Velocity Flowing Full (fps)	Depth of Flow (in) [goal seek]	X-sec Area of Flow (SF)	Hyd Radius (ft)	= 0	Actual Peak Velocity (fps)	d/D
11d	11c	1/2 NN1	67046	67046	2.89	193761	1041	4320	8	0.0051	8.0	1033.00	1.0	1010.17	555199	35%	2.5	3.3	0.1	0.1	0.00	2.25	0.41
11c	11	Flow From Line 11d - 11c	67046	67046																			
		1/2 NN1	67046	134091																			
		NN2	10391	144482																			
		1/4 Las Palmas Development	27000	171482																			
				171482	2.89	495584	1017	4160	10	0.0035	7.0	1010.00	1.0	994.44	837706	59%	2.4	5.5	0.3	0.2	0.00	2.5	0.55
11b	11a	1/2 Las Palmas Development	54000	54000	2.89	156060	1020	3120	8	0.0047	8	1012	0.8	996.40	537879	29%	2.4	2.9	0.1	0.1	0.00	2.1	0.37
11a	11	Flow From Line 11b- 11a	54000	54000																			
		1/4 Las Palmas Development	27000	81000																			
		F	19020	100020																			
		G	1902	101922																			
		M	7200	109122																			
				109122	2.89	315,363	1010	3840	10	0.0028	12.9	996.24	1.0	984.7	742898	42%	2.1	4.5	0.2	0.2	0.00	2.0	0.45
11	10	Flow From Line 11c - 11	171482	171482																			
		Flow From Line 11a-11	109122	280604																			
		1/2 A3	29173	309777																			
		B	19020	328,797																			
		1/3N	13333	342,131																			
		5.1	55296	397,427																			
		5.2	6657	404,084																			
		5.3	10190	414,274																			
		5.4	8152	422,426																			
				422,426	2.89	1,220,810	1000	2,640	15	0.0040	18.6	981.44	0.7	970.18	2640365	46%	3.3	7.152	0.577	0.303	0.00	3.3	0.48
9c	9b	O	12960	12,960																			
		W	3024	15,984																			
				15,984	2.89	46,194	993	1,550	8	0.0050	9.0	984.00	1.8	974.45	552224	8%	2.4	1.562	0.048	0.079	0.00	1.49	0.20
9a1	9a	1/2 2 (Amber Meadows)	21096	21,096																			
		2A	6114	27,210																			
		3A	6114	33,324																			
		3/5 3	49162	82,486																			
				82,486	2.89	238,383	987	2,675	10	0.0020	7.7	964.48	0.6	959.15	633246	38%	1.8	4.244	0.220	0.186	0.00	1.7	0.42
10	9	Flow From Line 11-10	422426	422,426																			
		1/3 N	13333	435,759																			
				435,759	2.89	1,259,343	987	2,736	15	0.0049	19.1	967.86	0.5	954.40	2922349	43%	3.7	6.869	0.548	0.295	0.00	3.6	0.46
9b1	9b	1/2 2 (Amber Meadows)	21096	21,096																			
		2/5 3	32774	53,870		0																	
				53,870	2.89	155,685	991	3,818	8	0.0035	8.0	983.00	1.1	968.54	462024	34%	2.0	3.194	0.130	0.143	0.00	1.9	0.40
9b	9a	4	16416	16,416																			
		Flow From Line 9c to 10b	15984	32,400																			
		Flow From Line 9b1 to 9b	53870	86,270																			
				86,270	2.89	249,321	981	1,130	8	0.0050	7.9	973.10	0.1	967.35	552224	45%	2.4	3.763	0.161	0.160	0.00	2.4	0.47
9a	9	Flow From Line 9b to 9a	86270	86,270																			
		Flow From Line 9a1 to 9a	82486	168,756																			
				168,756	2.89	487,705	971.30	2,600	15	0.0017	7.1	958.90	0.6	954.50	1716238	28%	2.2	5.463	0.404	0.249	0.00	1.9	0.36
9	8	Flow From Line 9a-9	168756	168,756																			
		Flow From Line 10-9	435759	604,515																			
		17 (5E, 4W-D, 4W-G, 4W-G, 4W-H, 4W-J, 4W-	80068	684,583						0.0027													
				684,583	2.89	1,978,444	973.90	4,200	24	0.0014	20.2	953.75	0.8	947.82	5470387	36%	2.7	9.963	1.233	0.440	0.00	2.5	0.42
8c	8b	A1	8150	8,150																			
		A2	40750	48,900																			
		1/2 A3	29173	78,073																			
		C	18600	96,673																			
		D	110316	206,989																			
		E1	37200	244,189																			
				244,189	2.89	705,706	1010	3,811	12	0.0035	13.9	996.14	0.8	982.00	1362202	52%	2.7	6.116	0.402	0.253	0.00	2.7	0.51

Table 4: Ultimate Sewer System

Start MH	End MH	Area ID	Average Flow (gpd)	Cumulative Average Flow (gpd)	Peaking Factor	Total Estimated Peak Flow (gpd)	Estimated Ground Elevation (feet)	Estimated Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Estimated Start Depth (feet)	Estimated Start Invert Elevation (ft)	Mid-line Bend Drops (ft)	Estimated End Invert Elevation (ft)	Sewer Line Capacity (gpd)	% Full (Q/Q_f)	Velocity Flowing Full (fps)	Depth of Flow (in) [goal seek]	X-sec Area of Flow (SF)	Hyd Radius (ft)	= 0	Actual Peak Velocity (fps)	d/D
8b	8a	Flow From Line 8c-8b	244189	244,189																			
		E2	4755	248,944																			
		AA1	22824	271,768																			
		AA2	87420	359,188																			
		17 (4W-A, 4W-B)	42505	401,693																			
				401,693	2.89	1,160,893	996	2,800	18	0.0055	14.1	981.50	0.6	965.55	5028062	23%	4.4	5.873	0.501	0.275	0.00	3.6	0.33
8a	8	Flow From Line 8b-8a	401693	401,693																			
		AA3	33792	435,485																			
		17 (4W-E, 4W-F, 4W-I)	30643.2	466,128																			
				466,128	2.89	1,347,111	982	3800	18	0.0041	16.6	965.45	0.8	949.90	4346863	31%	3.8	6.868	0.620	0.310	0.00	3.4	0.38
8	7	Flow From Line 8a-8	466128	466,128																			
		Flow From Line 9-8	684583	1,150,711																			
		AA4	24726	1,175,437																			
				1,175,437	2.89	3,397,012	971.40	1,129	24	0.0029	23.7	947.72	0.3	944.18	7873231	43%	3.9	10.999	1.404	0.472	0.00	3.7	0.46
7c	7b	X1	24726	24,726																			
		X2	82500	107,226																			
		X3	57660	164,886																			
		X4	21873	186,759																			
				186,759	2.89	539,734	1,013	5,280	10	0.0044	8.0	1005.00	1.0	981.01	934554	58%	2.7	5.442	0.303	0.219	0.00	2.8	0.54
7b	7a	Flow From Line 7c-7b	186759	186,759																			
		Y1	13314	200,073																			
		Y2	47104	247,177																			
				247,177	2.89	714,342	989	2,460	12	0.0045	8.2	980.84	0.5	969.25	1545986	46%	3.0	5.720	0.369	0.242	0.00	3.0	0.48
7a	7	Flow From Line 7b-7a	247177	247,177																			
		Z	98904	346,081																			
				346,081	2.89	1,000,174	978	2,460	15	0.0096	8.3	969.15	0.6	944.83	4090437	24%	5.2	5.044	0.362	0.234	0.00	4.3	0.34
7	6	Flow From Line 8-7	1175437	1,175,437																			
		Flow From Line 7a-7	346081	1,521,518																			
		BB1	13314	1,534,832																			
		BB2	11664	1,546,496																			
		DD1	92448	1,638,944																			
		DD2	19971	1,658,915																			
		KK	2853	1,661,768																			
		LL	9510	1,671,278																			
		MM	6657	1,677,935																			
		GG	0	1,677,935																			
		HH	0	1,677,935																			
		18	103248	1,781,183																			
				1,781,183	2.89	5,147,618	966.40	5,280	24	0.0047	22.3	944.08	1.7	917.58	10023120	51%	4.9	12.169	1.599	0.504	0.00	5.0	0.51
6d3	6d2	9.1	59472	59,472																			
		9.2	14265	73,737																			
				73,737	2.89	213,100	974	3,800	8	0.0050	8.7	965.26	0.4	945.86	552224	39%	2.4	3.443	0.144	0.151	0.00	2.3	0.43
6d2	6d1	Flow from line 6d3 to 6d2	73737	73,737																			
		8	30816	104,553																			
		1/3 N	13333	117,886																			
		JJ	2580	120,466																			
		II	24800	145,266																			
				145,266	2.89	419,820	957	4,353	10	0.0032	11.2	945.76	1.0	930.83	801000	52%	2.3	5.132	0.282	0.212	0.00	2.3	0.51
6d1	6d	Flow From Line 6d2 to 6d1	145266	145,266																			
				145,266	2.89	419,820	941	1,050	10	0.0032	8.8	930.73	0.1	927.27	801000	52%	2.3	5.132	0.282	0.212	0.00	2.3	0.51
6f	6e	P1	32,400	32,400																			
		P2	12000	44,400																			
				44,400	2.89	128,316	958	4,515	8	0.0033	5.7	952.32	1.0	936.42	448629	29%	2.0	2.924	0.115	0.133	0.00	1.7	0.37

Table 4: Ultimate Sewer System

Start MH	End MH	Area ID	Average Flow (gpd)	Cumulative Average Flow (gpd)	Peaking Factor	Total Estimated Peak Flow (gpd)	Estimated Ground Elevation (feet)	Estimated Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Estimated Start Depth (feet)	Estimated Start Invert Elevation (ft)	Mid-line Bend Drops (ft)	Estimated End Invert Elevation (ft)	Sewer Line Capacity (gpd)	% Full (Q/Q_f)	Velocity Flowing Full (fps)	Depth of Flow (in) [goal seek]	X-sec Area of Flow (SF)	Hyd Radius (ft)	= 0	Actual Peak Velocity (fps)	d/D
6e	6d	Flow from line 6f - 6e	44400	44,400																			
		7	65664	110,064																			
				110,064	2.89	318,085	942	2,560	10	0.0033	5.7	936.32	0.6	927.27	813419	39%	2.3	4.335	0.227	0.189	0.00	2.2	0.43
6d	6c	Flow From Line 6e to 6d	110064	110,064																			
		Flow From Line 6d2 to 6d	145266	255,330																			
		2/5 6	39744	295,074																			
		12.2	12960	308,034																			
		12.3	7998	316,032																			
				316,032	2.89	913,333	937	1297	15	0.0018	10.3	926.67	0.3	922.05	1771211	52%	2.2	7.624	0.626	0.316	0.00	2.3	0.51
6c	6b	Flow From Line 6d - 6c	316032	316,032																			
		2/5 6	39744	355,776																			
		12.1	50950	406,726																			
				406,726	2.89	1,175,439	945.78	1354	18	0.0015	22.8	921.80	0.3	919.75	2644965	44%	2.3	8.389	0.807	0.358	0.00	2.3	0.47
6b	6a	Flow From Line 6c - 6b	406726	406,726																			
		13.1	37200	443,926																			
		13.2	20480	464,406																			
		1/5 6	19872	484,278																			
				484,278	2.89	1,399,564	948.31	1313	18	0.0017	28.6	919.75	0.3	917.50	2808898	50%	2.5	8.965	0.879	0.374	0.00	2.5	0.50
6a	6	Flow From Line 6b - 6a	484278	484,278																			
		6A	12228	496,506																			
		19	19440	515,946																			
				515,946	2.89	1,491,085	944.70	1,147	24	0.0007	27.5	917.25	0.3	916.45	3868148	39%	1.9	10.322	1.292	0.452	0.00	1.8	0.43
6	5	Flow From Line 7-6	1781183	1,781,183																			
		Flow From Line 6a-6	515946	2,297,129																			
		OO3	7817	2,304,946																			
		14d	22784	2,327,730																			
		16.2	13536	2,341,266																			
		16.1	20160	2,361,426																			
		FF	12800	2,374,226																			
				2,374,226	2.89	6,861,514	939.30	2,762	36	0.0014	23.3	916.00	0.5	911.96	16331918	42%	3.6	16.250	3.098	0.701	0.00	3.4	0.45
20i	20h	1/5 11.2	12154	12,154																			
		11.1	25677	37,831																			
		Q	12960	50,791																			
				50,791	2.89	146,785	919	390	8	0.0250	23.3	895.73	0.0	885.98	1234811	12%	5.5	1.860	0.062	0.092	0.00	3.7	0.23
20h1	20h	1/3 14.1B	5040	5,040																			
		1/2 14.1	9360	14,400																			
		15.2B	20511	34,911																			
		15.1	23616	58,527																			
				58,527	2.89	169,143	920	2,500	10	0.0028	27.0	892.97	0.0	885.98	748731	23%	2.1	3.226	0.152	0.151	0.00	1.7	0.32
20e	20d	1/3 10	15552	15,552																			
				15,552	2.89	44,945	939	1,842	8	0.0020	8.0	930.33	0.0	926.65	349257	13%	1.5	1.935	0.065	0.095	0.00	1.1	0.24
20d	20c	Flow From Line 20e to 20d	15552	15,552																			
		2/3 10	31104	46,656																			
		21.1	15984	62,640																			
				62,640	2.89	181,030	928	1,415	8	0.0020	6.0	921.33	0.0	918.50	349257	52%	1.5	4.079	0.179	0.169	0.00	1.6	0.51
20c	20b	Flow From Line 20d-20c	62640	62,640																			
		20.5	18259	80,899																			
		1/3 20.2	19989	100,889																			
				100,889	2.89	291,568	925	780	10	0.0020	10.0	918.23	0.0	916.67	633246	46%	1.8	4.757	0.256	0.202	0.00	1.8	0.48
20b	20a	Flow From Line 20c-20b	100889	100,889																			
		U	2160	103,049																			
		20.3A	16915	119,964																			
		2/3 20.2	39979	159,943																			
		1/2 20.3		159,943																			
				159,943	2.89	462,235	925	1,300	12	0.0020	13.7	916.40	0.0	913.80	1029728	45%	2.0	5.625	0.361	0.240	0.00	2.0	0.47
20a	Las Brisas LS	Flow From Line 20b-20a	159943	159,943	2.89	462,235	914	1,344	12	0.0020	11.0	913.80	0.0	911.11	1029728	45%	2.0	5.625	0.361	0.240	0.00	2.0	0.47

Table 4: Ultimate Sewer System

Start MH	End MH	Area ID	Average Flow (gpd)	Cumulative Average Flow (gpd)	Peaking Factor	Total Estimated Peak Flow (gpd)	Estimated Ground Elevation (feet)	Estimated Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Estimated Start Depth (feet)	Estimated Start Invert Elevation (ft)	Mid-line Bend Drops (ft)	Estimated End Invert Elevation (ft)	Sewer Line Capacity (gpd)	% Full (Q/Q_f)	Velocity Flowing Full (fps)	Depth of Flow (in) [goal seek]	X-sec Area of Flow (SF)	Hyd Radius (ft)	= 0	Actual Peak Velocity (fps)	d/D
20h	20g	Flow From Line 20i-20h	50791	50,791																			
		Flow From Line 20h1-20h	58527	109,318																			
		15.2a	23184	132,502																			
		20.4	20382	152,884																			
				152,884	2.89	441,834	910	1,992	12	0.0022	8.7	885.64	0.0	881.20	1087062	41%	2.1	5.316	0.336	0.231	0.00	2.0	0.44
20f	Las Brisas LS	1/2 20.3	52372	52,372																			
		S	1296	53,668																			
		4/5 11.2	48614	102,283																			
				102,283	2.89	295,597	928	4,297	12	0.0055	17.0	910.52	0.0	887.00	1703505	17%	3.4	3.378	0.181	0.162	0.00	2.5	0.28
20g	Las Brisas LS	Flow from Line 20h-20g	152884	152,884																			
		R	4320	157,204																			
		H	4320	161,524																			
				161,524	2.89	466,803	906	1,350	12	0.0022	24.9	881.10	0.0	878.14	1078168	43%	2.1	5.510	0.352	0.236	0.00	2.1	0.46
12a	12b	1/4 J	75388	75,388																			
				75,388	2.89	217,870	905	3,350	8	0.0035	8.0	896.41	0.6	884.08	462024	47%	2.0	3.858	0.167	0.163	0.00	2.0	0.48
12c	12b	1/4 J	75388	75,388																			
				75,388	2.89	217,870	903	1,200	8	0.0100	8.0	896.28	0.2	884.08	780963	28%	3.5	2.885	0.113	0.132	0.00	3.0	0.36
12b	Las Brisas LS	Flow From Line 12a-12b	75388	75,388																			
		Flow From Line 12c-12b	75388	150,775																			
				150,775	2.89	435,740	905	1,000	12	0.0019	8.0	883.98	0.2	881.88	1003654	43%	2.0	5.519	0.353	0.237	0.00	1.9	0.46
Las Brisas LS	5a	Flow From Line 20f-Las BrisasLS	102283	102,283																			
		Flow From Line 20g-Las Brisas LS	161524	263,806																			
		Flow From Line 20a- Las Brisas LS	159943	423,749																			
		Flow From Line 12b-Las BrisasLS	150775	574,524																			
				574,524	From Table 3	2,980,000	Forcemain																
5a	5	2/3 14.1B	10080	10,080																			
		14.1C	7920	18,000																			
		1/2 14.1	9360	27,360																			
				27,360	2.89	79,070																	
		Las Brisas Lift Station	2980000			3,059,070	925.95	1,600	30	0.0011	12.02	913.93		912.20	8711493	35%	2.7	12.253	1.885	0.544	0.00	2.5	0.41
13a	Extension Canal LS	I	38040	38040																			
		1/4 J	75388	113428																			
				113428	2.89	327,805	889	8,000	12	0.0025	6.0	883.00	0.8	862.20	1151270	28%	2.3	4.375	0.259	0.200	0.00	2.0	0.36
13b	Extension Canal LS	1/4 J	75388	75388																			
		K	19020	94408																			
		L	6657	101065																			
				101,065	2.89	292,076	902	11,260	12	0.0020	6.0	896.00	0.2	873.28	1029728	28%	2.0	4.366	0.258	0.199	0.00	1.8	0.36
Extension Canal LS	14	Flow From Line 13a-Extension Canal LS	113428	113,428																			
		Flow From Line 13b-Extension Canal LS	101065	214,492																			
				214,492	From Table 3	1,360,000	Forcemain																
Lakin	14	Lakin Lift Station	2500000	2,500,000	From Table 3	2,500,000	Forcemain																
14	Rubbermaid LS	Extension Canal LS to 14	1360000	1,360,000																			
		Lakin Lift Station	*2500000*	3,860,000																			
				3,860,000		3,860,000	905	200	24	0.0020	8.0	897.00	0.0	896.60	6538363	59%	3.2	13.239	1.777	0.531	0.00	3.4	0.55
Rubbermaid LS	5	Flow From Line 14 to Rubbermaid LS	3860000	3,860,000																			
		EE	280446	4,140,446																			
		OO1	53817	4,194,263																			
		OO2	123375	4,317,638																			
				4,317,638	From Table 3	4,410,000	Forcemain																

Table 4: Ultimate Sewer System

	Start MH	End MH	Area ID	Average Flow (gpd)	Cumulative Average Flow (gpd)	Peaking Factor	Total Estimated Peak Flow (gpd)	Estimated Ground Elevation (feet)	Estimated Length (feet)	Line Diameter (inches)	Sewer Line Slope (ft/ft)	Estimated Start Depth (feet)	Estimated Start Invert Elevation (ft)	Mid-line Bend Drops (ft)	Estimated End Invert Elevation (ft)	Sewer Line Capacity (gpd)	% Full (Q/Q_f)	Velocity Flowing Full (fps)	Depth of Flow (in) [goal seek]	X-sec Area of Flow (SF)	Hyd Radius (ft)	= 0	Actual Peak Velocity (fps)	d/D
	5	4	Flow From Line 6-5	2374226	2,374,226	2.89	6,861,514																	
			Flow From Line Rubbermaid LS-5	4410000																				
			Flow From Line 5a-5 (with Las Brisas LS)	3059070																				
				7469070			14,330,584	926.49	1,600	54	0.0013	15.6	910.93		908.85	45822530	31%	4.5	20.705	5.613	0.934	0.00	4.0	0.38
	4	3	Flow From Line 5-4	14330584	14,330,584		14,330,584	932.73	1,200	54	0.0010	23.9	908.85		907.61	40853344	35%	4.0	22.043	6.104	0.979	0.00	4.0	0.41
	3	2	Flow From line 4-3	14330584	14,330,584		14,330,584	936.34	2,580	54	0.0008	28.7	907.61		905.57	35736550	40%	3.5	23.743	6.734	1.032	0.00	4.0	0.44
	Bio Flora LS	1	Bio Flora Lift Station	460000	460,000	From Table 3	460,000	Forcemain																
	2	1	Flow From line 3-2	14330584	14,330,584																			
					14,330,584		14,330,584	936.80	1,900	60	0.0007	31.2	905.62		904.20	46014503	31%	3.6	22.954	6.909	1.036	0.00	0.0	0.38
	1	End	Bio Flora LS to 1	460000	460,000																			
			2 to 1	14330584	14,790,584																			
					14,790,584		14,790,584																	
				Total =	14,790,584		14,790,584																	

NOTES:

1. Flows for Table 4 reflect the contribution of flows outside of the WGCPA study area. WGCPA contributing sewage flows may be found in Tables 2A, 2B, 2C. Area sewage flows are tabulated from the entire planning area as shown in Figure 5.

2 XXXXXX Inverts taken from record drawings available from COG.

The City has indicated that it is actively planning for a 2 MGD expansion of treatment capacity by FY 2017/2018 to be obtained by increasing influent lift station pumping capacities with the replacement of existing pumps and the replacement of existing travelling bridge-type sand filters with disc filter to achieve a more rapid filtration rate.

Whether improvements to increase treatment capacities to accommodate WGCPA flows and flow from the remainder of the 157th Avenue Basin would require the City to update the existing master plan studies performed for the City by Malcolm Pirnie, Inc. (now Arcadis). It is expected that these improvements would be designed as modular expansions to the treatment plant of a size sufficient to accommodate forecasted near term flow increases.

2.7 Brine Disposal

Some of the raw water supplying the development area will be treated brackish groundwater. Waste brine from the reverse-osmosis process must be disposed of properly and will not be allowed to enter the sewer system for treatment at the 157th Avenue Facility. Disposal options will be discussed in the Master Water Study.

3.0 CONNECTION TO EXISTING FACILITIES

3.1 Collection System

Wastewater generated by the WGCPA will be connected to the City's existing sewer system at several locations, listed below and shown in Figure 5.

- Existing 24-inch sewer at Yuma Road and Citrus Road
- Existing 30-inch sewer at Lower Buckeye Road and Cotton Lane
- Existing 24-inch sewer at Dunlap Avenue and 175th Avenue
- Existing 54-inch sewer at Dunlap Avenue and Cotton Lane

Our analysis indicates that insufficient fall exists to connect the entire WGCPA to the existing collection system by gravity at some of the locations listed above. Lift stations will connect to the existing system using force mains as previously discussed. Figure 5 shows the WGCPA collection system areas that include a lift station and the area served by the gravity portion of the system. The areas south of the Southern Pacific Railroad will be served by three proposed lift stations as discussed above.

3.1.1 Capacity Analysis – 159th Avenue and MC 85

The 2006 report identified a reach in the City's existing interceptor system that was potentially undersized for the future anticipated ultimate flows generated by the entire 157th Avenue treatment plant basin upstream of that location. This reach was identified as the 'bottleneck" and is located at the intersection of the 159th Avenue alignment and MC 85 where upstream 60-inch and 30-inch interceptors are connected to a 42-inch and 18-inch sewers. The bottleneck extending south of MC 85 to the treatment plant site along 159th Avenue where the existing parallel lines are 24-inch and 36-inch. Figure 7 depicts the sewers discussed above.

In light of the changes to the land use plan and new flow data from the WGCPA, this report revisits the capacity of the sewer crossing the SPRR to determine if sufficient excess capacity exists in the line to accept flows from the tributary area. All slopes obtained from available as-built information.

N:\07\0112705\Enviro\CADD\Goodyear Map\sewer\159AVE-SWR-Figure 7.dwg Breanne, Dec 12, 2012 - 2:52pm

7 FIGURE	JOB NO 1.07.0112705	159th AVENUE SEWER TRUNK LINES AT MC 85 CROSSING
		4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831

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- Capacity at 159th Avenue/MC Route 85 interceptor crossings:

42-inch @ S = 0.0046 ft/ft	= 45.0 MGD
18-inch @ S = 0.0103 ft/ft	= 6.8 MGD
Total Capacity at Crossing:	= 51.8 MGD

Estimated total tributary area flows:

Exist. 30-inch Sarival	= 11.2 MGD
Cotton Lane Service Area[1]	= 17.0 MGD
39-inch Estrella Parkway	= 19.5 MGD
Total Flows at Crossing:	= 47.7[2] MGD

Pipe Capacity > Anticipated Flows and sufficient capacity exists in this reach.

- South of MC Route 85 along 159th Ave.:

36-inch @ S = 0.0012 ft/ft	= 15.0 MGD
24-inch @ S = 0.0012 ft/ft	= 5.2 MGD
Total Capacity	= 20.2 MGD
Total Flow	= 47.7 MGD

Pipe Capacity < Anticipated Flows

Must implement construction of parallel sewer to WWRF in this reach at some point in the future. CVL notes that current (2012) inflows to the treatment plant are approximately 3.2 MGD and sufficient capacity exists in the existing pipes to convey this flow. It is recommended that the City implement a program to tract flows at MC 85/159th Avenue when treatment plant inflows are 10 MGD.

- AT WWTP, Single 24-inch Pipe

24-inch @ S = 0.0019 ft/ft = 6.5 mgd

These capacities are very much less than anticipated future flows. The capacity is less than that required for accommodating WGCPA ultimate flows of 10.5 MGD. The City is aware of this issue and will upgrade the incoming interceptors as part of future treatment plant improvements to be identified in subsequent treatment plant master plans.

[1] Includes 10.5 MGD from WGCPA (Table 2C) which is included in the total of 14.7 MGD from Table 4. Balance of 2.3 MGD from other area not defined in this report that may be contributing to these flows.

[2] Flows taken from 2006 study for those areas not included in WGCPA.

3.2 157th Avenue Treatment Plant

All flows generated by the WGCPA will be treated at the City's 157th Avenue Water Reclamation Facility. This facility provides for tertiary treatment of municipal sewerage and has a current design capacity of 4.0 MGD.

As discussed above, the WWRF is currently (2012) treating wastewater flows at 80 percent of its 4.0 MGD capacity or 3.2 MGD. The City projects that 90 percent capacity will be reached by the fiscal years 2015/2016 and 95% capacity by 2017/2018. A 2 MGD expansion is under consideration for design. Construction of this additional capacity is planned to commence in 2015.

Future buildout flows of 3.6 MGD are expected from the WGCPA of which 1.5 MGD will be contributed by the IDG properties (see Table 2c).

The City has indicated that the 157th Avenue WRF will be expanded by 2.0 MGD by FY 2017/2018. Some of this capacity may be made available to the IDG subject to City approval. Additional Treatment plant capacity expansion will be necessary to accommodate anticipated flows from IDG and WGCPA as shown in Table 5 below.

Table 5 - 157th Avenue WRF Capacity

Item	Description	Flow (MGD)	Remarks
1	Current Built Capacity	4.0	Permitted Maximum Discharge
2	90% Design Discharge	3.6	Taking as 90% of max permitted discharge per ADEQ criterion
3	2012 WRF Inflow	3.2	From COG
4	2012 Excess Capacity	0.4	Item 2 – Item 3
5	Planned 2017/2018 Expansion	2.0	From COG
6	WRF Total Capacity 2018	6.0	Item 1 + Item 5
7	90% Design Discharge 2018	5.4	90% of Item 6
8	Projected 2018 Flows	3.8	Estimated
9	2018 Excess Capacity	1.6	Item 7 – Item 8
10	IDG Estimated Discharges	1.5	Table 2c in Report
11	Capacity Shortfall 2012	(1.1)	Item 4 – Item 10
12	Excess Capacity 2018	0.1	Item 9 – Item 10

[1] Upon reaching 90 percent of Permitted Discharge, WRFs are required to have begun construction of an expansion of the treatment capacity.

Review of the flow and capacity data in Table 4 indicates that the current WRF treatment capacity is insufficient to accept discharges from the IDG participating properties at buildout. The proposed 2 MGD treatment expansion contemplated in 2018 is sufficiently large to accommodate buildout IDG discharges.

3.3 Funding of Proposed Infrastructure Improvements

3.3.1 General

As previously discussed in this report, the WGCPA regional sewer trunk line system will be constructed in numerous sections by various private developers as necessary as each of the various WGCPA properties in the service area are developed. The property owners for the

planned projects are identified in Figure 2. The current estimate of gross acreage from each of the participating developments to be served by the proposed sewer system improvements is 3,115 acres. This report quantifies each participating developer's proportionate responsibilities of the sewer work as shown in Table 7. The City will administer a Cost Recovery Ordinance (CRO) for the WGCPA area to reimburse the participating developers who install these sewer trunk lines of all cost in excess of that developer's proportionate responsibility for designing and installing the various segments of sewer infrastructure shown in Figure 6.

Costs projected in the CRO tables are determined for each property on a gross acreage basis. A cost per EDU has been calculated to determine the proportional share of all land uses for the wastewater infrastructure improvements. Costs were allocated based on equivalent dwelling units (EDUs). Tables 6a and 6b list the allocation of EDUs by property.

Table 6a – IDG Properties EDU

Area	IDG Development Group Properties	Land Use	Area	Average Flows	EDU[1]
ID			(acres)	(gpd)	
1	Las Palmas	Single Family	273	108,000	750
2	Amber Meadows	Single Family	102	42,192	293
2A	Amber Meadows School	School	6	6,114	42
3	La Privada	Single Family	194	81,936	569
3A	La Privada School	School	6	6,114	42
4	Paseo Ridge Phase II	Single Family	40	16,416	114
5	Silva-Rose Gardens	Single Family	135	55,296	384
5	Silva-Rose	Commercial Pad	7	6,657	46
5	Silva-Rose Gardens	City Water &Fire Campus	10	10,190	71
5	Silva-Rose Gardens	Charter School	8	8,152	57
6	La Jolla Vista	Single Family	188	99,360	690
6A	La Jolla Vista School	School	12	12,228	85
7	Pradera	Single Family	160	65,664	456
8	Paseo Ridge Phase I	Single Family	80	30,816	214
9	las Ventanas Single Family	Single Family	145	59,472	413
9	las Ventanas	Commercial Pad	15	14,265	99
10	Las Brisas Phase I	Single Family	120	46,656	324
11	Levinson	Commercial Pad	27	25,677	178
11	Levinson	Single Family	133	60,768	422
12	Citrus Ridge	Agua Fria HS District	50	50,950	354
12	Citrus Ridge (R1-6)	Single Family	19	12,960	90
12	Citrus Ridge (C2)	Commercial Pad	8	7,998	56
13	Cotton Commons (MHD)	Multi-Family	20	37,200	258
13	Cotton Commons (MD)	Multi-Family	20	20,480	142
14.1a	El Cidro Ranch	Single Family	38	18,720	130

14.1b	El Cidro Ranch	Single Family	28	15,120	105
14.1c	El Cidro Ranch	Single Family	18	7,920	55
14.1d	El Cidro Ranch	Multi Family	18	22,784	158
15	El Cidro Ranch	Single Family	48	23,616	164
15.2a	El Cidro Ranch	Single Family	42	23,184	161
15.2b	El Cidro Ranch	Single Family	39	20,511	142
16	El Cidro Ranch	Single Family	42	20,160	140
16	El Cidro Ranch	Single Family	24	13,536	94
17	Canyon Trails 4 West (Centex)	Single Family	310	153,216	1,064
18	Canyon Trails 4 South (TM)	Single Family	255	103,248	717
19	Sin Lomas	Single Family	40	19,440	135
20	Las Brisas Phase 2	Single Family	40	15,984	111
20	Las Brisas Phase 2	Single Family	150	59,968	416
20	Las Brisas Phase 2	Single Family	131	52,372	364
20.3 A	Las Brisas Phase 2 School	School	17	16,915	117
20	El Cidro Ranch	Single Family	38	20,382	142
21	Las Brisas Phase 2	Commercial Pad	19	18,259	127
Subtotal			**3,075**	**1,510,897**	**3,874**

[1] EDU = Average Day Flow/144 gpd, flow factor for low density SF land use.

Table 6b – Additional Development Properties EDU

Area	Land Use	Area	Average Flows	EDU[1]
(ID)		(acres)	(gpd)	
A1	Light Industrial	10	8,150	57
A2	Light Industrial	50	40,750	283
A3	Light Industrial	72	58,346	405
B	Community Commercial	20	19,020	132
C	M-HDR Multi-Family	10	18,600	129
D	Community Commercial	116	110,316	766
E1	M-HDR Multi-Family	20	37,200	258
E2	Community Commercial	5	4,755	33
F	Community Commercial	20	19,020	132
G	Community Commercial	2	1,902	13
H	LDR	10	4,320	30
I	Community Commercial	40	38,040	264
J	County Land-Light Industrial	370	301,550	2,094
K	Community Commercial	20	19,020	132
L	Community Commercial	7	6,657	46
M	County Land-RR	45	7,200	50
N	County Land-RR	250	40,000	278
O	County Land-LDR	30	12,960	90

Area	Land Use	Area	Average Flows	EDU[1]
P1	County Land-LDR	75	32,400	225
P2	County Land-RR	75	12,000	83
Q	County Land-LDR	30	12,960	90
R	County Land-LDR	10	4,320	30
S	LDR	3	1,296	9
U	LDR	5	2,160	15
W	LDR	7	3,024	21
X1	Community Commercial	26	24,726	172
X2	HDRMulti-Family	30	82,500	573
X3	M-HDRMulti-Family	31	57,660	400
X4	Community Commercial	23	21,873	152
Y1	Community Commercial	14	13,314	92
Y2	MDRMulti-Family	46	47,104	327
Z	Community Commercial	104	98,904	687
AA1	Community Commercial	24	22,824	159
AA2	M-HDRMulti-Family	47	87,420	607
AA3	MDRMulti-Family	33	33,792	235
AA4	Community Commercial	26	24,726	172
BB1	Community Commercial	14	13,314	92
BB2	LDR	27	11,664	81
DD1	LDR	214	92,448	642
DD2	Community Commercial	21	19,971	139
EE	General Industrial	258	280,446	1,948
FF	County Land-RR	80	12,800	89
GG	Open Space	8	-	0
HH	Open Space	1	-	0
II	County Land-RR	155	24,800	172
JJ	L-MDR SingleFamily	4	2,580	18
KK	Community Commercial	3	2,853	20
LL	Community Commercial	10	9,510	66
MM	Community Commercial	7	6,657	46
NN1	County Land-Community Commercial	141	134,091	931
NN2	County Land-Light Industrial	13	10,391	72
OO1	General Industrial	50	53,817	374
OO2	General Industrial	114	123,375	857
OO3	Community Commercial	8	7,817	54
Sub Total		**2,833**	**2,137,343**	**14,843**
			-	
Grand Total of Service Area		**5,908**	**3,648,240**	**18,717**

[1] EDU = Average Day Flow/144 gpd, flow factor for low density SF land use.

3.3.2 Cost Recovery Ordinance Amendment

The allocation of costs to install the required sewer system improvements between the participating parties of the IDG was documented in a Cost Recovery Ordinance (CRO) implemented by the COG in 2006. In this update to the 2006 wastewater master plan, it is noted that portions of the recommended sewer infrastructure improvements were installed by certain IDG participants since 2006. These mains are identified in Figure 6.

As previously noted in this report, the Las Brisas development has installed a lift station and other sewers within the parcel since approval of the 2006 Wastewater Master Plan and CRO. The lift station's dual 8-inch and 10-inch force mains discharge to an existing manhole on the 30-inch Dunlap Road interceptor east of Cotton Lane. As part of the preparation of grading, drainage, paving, water, and sewer plans for the Las Brisas and El Cidro developments, the alignment of the sewers in both developments were modified from the 2006 Master Wastewater Study as described below and shown in Figure 6:

- *El Cidro* – All parcels west of 173rd Lane with the exception of two streets in the north portion of Phase 1 Parcel 1D and Phase 4 Parcel 2 flow to El Cidro Boulevard to Citrus Road and south on Citrus Road to Broadway Road, west to the Las Brisas Lift Station. Parcels east of 173rd Lane flow to the existing 30-inch Dunlap Road/Elwood Road interceptor.

  The Citrus Road sewer serving the El Cidro parcel will also collect wastewater from the east two-thirds of the Levinson parcel. This sewer will serve portions of both the El Cidro and Levinson properties and will be included in a MODIFIED CRO. CVL has given this line the designation "O" and adjusted Tables 4, 6, and 7.

- *Las Brisas* – The west one-third of the Levinson parcel will be served by the extension of an internal Las Brisas line as shown in Figures 5 and 6. As above, this line will be added to a MODIFIED CRO. CVL has identified this line as "P" in Figure 6. Tables 4, 6, and 7 have been updated as well.

These changes result in the elimination of two segments of the gravity sewer line in El Cidro Boulevard/Elwood Road/Dunlap Road alignment from the 2006 CRO. This sewer now becomes a project specific sewer line serving the El Cidro property, only, until its intersection with a sewer in Citrus Road serving the east two-thirds of the Levinson property at Citrus Road and El Cidro Boulevard. These two eliminated segments were previously listed in the 2006 CRO as projects D (West El Cidro) and the west ½ of project C (East El Cidro). The east ½ of C has been relabeled as C1 in the proposed 2012 CRO.

A reallocation of costs to each participating property for the installation of the remaining future sewer system improvements has become necessary as a result of the installation of sewer lines under the 2006 CRO. This reallocation has been performed and is presented in this report. We note that the original CRO MUST BE AMENDED by COG to accurately reflect the revised allocations of sewer system improvements costs.

3.3.3 Cost Allocation

By order of the COG City Council the WGCPA participating property owners identified in Figure 3 will share in the costs of the sewer lines identified in Figure 6 through the CRO as reimbursements to the installing developer. This share is determined by calculating the ratio of each property's gross acreage to the acreage of the participating development. Table 7 shows each sewer and each developer's responsibility for the installation costs of the sewer reach under consideration expressed as a percentage of the sewer's total cost. For example, El Cidro Ranch is responsible for contributing 6.64 percent of trunk sewer "B" and 20.56 percent of trunk sewer "C" because its wastewater flows in "C" are a greater fraction of the total contributing flow than those in line "B". It may also be noted that there are fewer participating developers discharging flows to "C" when compared to "B" and that the construction costs would be shared between fewer parties, each party having therefore a larger share of the costs.

At this time, each developer's responsibility for trunk sewer costs is shown as a percentage in Table 7. As various segments of the trunk sewer system are constructed and approved, the installing property shown in Figure 2 will file for compensation in accordance with the requirements of the Reimbursement Agreement under the CRO. Upon the commencement of construction of the participating property owners shown in Figure 2 will be asked to contribute to the reimbursement of the installing property's costs by an amount to be shown as a cost figure calculated from the percentages now presented in Table 7. Table 7 contains an estimate of costs for the installation of the various sewer segments with the exception of segments N, K, J, I, E, and B that have been installed and the costs shown are "as bid" by contractors. The total value of the costs associated with the installation of the IGD sewer system in the WGCPA is $20,011,009.

In addition, we note that the calculation of flows from the participating properties using the 2012 unit factors indicates that total discharges have decreased when compared with the 2006 report. This may result in the reduction in pipe line sizes for those CRO sewers not yet built. Costs of the pipe installation shown in Table 8 for those segments have not been changed, however, because the estimates indicate a maximum recovery amount allowed by the CRO. The allowable recovery costs assigned to the participating properties will be based on ACTUAL construction costs.

TABLE 7

Coe and Van Loo
Consultants, Inc.

West Goodyear Central Planning Area - Master Wastewater Trunk Line Study: Percentage Responsibility Percentages

December 11, 2012

			TRUNK LINE DESCRIPTIONS														
			B	C1	E	F	G1	G2	H1	I	J	K	L	M	N	O	P	A
	Project Name	Estimated Area	E. Elwood / 159th Ave.	Loop 303/El Cidro	S. Cotton	E. Lower Buckeye	Citrus / L. Buckeye	W. Lower Buckeye	S. Citrus	N. Cotton	E. Yuma	W. Yuma	N. Citrus	N. Citrus (Las Palmas)	183rd Ave. & Yuma	S. Citrus	Las Brisas	159th Ave (Bottleneck)
																		Cost By City
1	Las Palmas	273	8.76%		13.45%					24.93%	24.93%	29.04%	63.05%	100.00%				N/A
2	Amber Meadows	108	3.46%		5.32%					9.86%	9.86%	11.49%			30.68%			N/A
3	La Privada	200	6.42%		9.85%					18.26%	18.26%	21.28%			56.82%			N/A
4	Lees	44	1.41%		2.17%					4.02%	4.02%	4.68%			12.50%			N/A
5	Silva	160	5.13%		7.88%					14.61%	14.61%	17.02%	36.95%					N/A
6	La Jolla Vista	200	6.42%		9.85%	31.25%		33.33%										N/A
7	Pradera	160	5.13%		7.88%	25.00%	40.00%	26.67%										N/A
8	Van Leeuwen	80	2.57%		3.94%	12.50%	20.00%	13.33%	33.33%									N/A
9	Las Ventanas	160	5.13%		7.88%	25.00%	40.00%	26.67%	66.67%									N/A
10	Las Brisas Phs 1	120	3.85%	11.92%														N/A
11	Levinson	160	5.13%	15.89%												43.60%	29.63%	N/A
12	Citrus Ridge	80	2.57%	7.94%														N/A
13	Cotton Commons	40	1.28%		1.97%	6.25%												N/A
14	El Cidro Ranch	207	6.64%	20.56%												56.40%		N/A
15	Citrus Road 60	60	1.92%	5.96%														N/A
16	Cotton Lane 76	80	2.57%															N/A
17	Canyon Trails 4 West (Centex)	310	9.95%		15.27%					28.31%	28.31%	16.49%						N/A
18	Canyon Trails 4 South (TW)	255	8.18%		12.56%													N/A
19	Sin Lomas	40	1.28%		1.97%													N/A
20	Las Brisas 2	380	12.19%	37.74%													70.37%	N/A
			100.00%	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	
	Grand Total Acres	**3117**																
	Total area tributary to the trunk line segment		3117	1007	2030	640	400	600	240	1095	1095	940	433	273	352	367	540	2552

TABLE 8

Coe and Van Loo Consultants, Inc.

West Goodyear Central Planning Area - Master Wastewater Trunk Line Study: Maximum Cost Reimbursement Matrix

December 11, 2012

				TRUNK LINE DESCRIPTIONS															
				B	C1	E	F	G1	G2	H1	I	J	K	L	M	N	O	P	A
	Project Name	Estimated Area	Total Developer Costs	E. Elwood / 159th Ave.	Loop 303/El Cidro	S. Cotton	E. Lower Buckeye	Citrus / L. Buckeye	W. Lower Buckeye	S. Citrus	N. Cotton	E. Yuma	W. Yuma	N. Citrus	N. Citrus (Las Palmas)	183rd Ave. & Yuma	S. Citrus	Las Brisas	159th Ave (Bottleneck)
			$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	Cost By City
1	Las Palmas	273	$2,993,099	$613,090		$235,344					$632,832	$201,750	$345,631	$570,466	$393,987				N/A
2	Amber Meadows	108	$1,077,333	$242,541		$93,103					$250,351	$79,813	$136,733			$274,792			N/A
3	La Privada	200	$1,995,061	$449,150		$172,413					$463,613	$147,802	$253,210			$508,873			N/A
4	Lees	44	$438,913	$98,813		$37,931					$101,995	$32,516	$55,706			$111,952			N/A
5	Silva	160	$1,523,289	$359,320		$137,930					$370,891	$118,242	$202,568	$334,339					N/A
6	La Jolla Vista	200	$1,145,853	$449,150		$172,413	$184,194		$340,096										N/A
7	Pradera	160	$1,200,009	$359,320		$137,930	$147,355	$283,327	$272,077										N/A
8	Van Leeuwen	80	$835,183	$179,660		$68,965	$73,678	$141,663	$136,038	$235,178									N/A
9	Las Ventanas	160	$1,670,366	$359,320		$137,930	$147,355	$283,327	$272,077	$470,357									N/A
10	Las Brisas Phs 1	120	$370,405	$269,490	$100,915														N/A
11	Levinson	160	$726,055	$359,320	$134,553												$115,604.14	$116,577.78	N/A
12	Citrus Ridge	80	$246,937	$179,660	$67,277														N/A
13	Cotton Commons	40	$161,151	$89,830		$34,483	$36,839												N/A
14	El Cidro Ranch	207	$788,511	$464,870	$174,079												$149,562.86		N/A
15	Citrus Road 60	60	$185,203	$134,745	$50,458														N/A
16	Cotton Lane 76	80	$179,660	$179,660															N/A
17	Canyon Trails 4 West (Centex)	310	$2,107,354	$696,182		$267,240					$718,601	$229,093	$196,237						N/A
18	Canyon Trails 4 South (TW)	255	$792,493	$572,666		$219,827													N/A
19	Sin Lomas	40	$124,313	$89,830		$34,483													N/A
20	Las Brisas 2	380	$1,449,821	$853,385	$319,565													$276,872.22	N/A
	Total Built To Date		$14,134,423																
	Total To Be Built		$5,876,586																
	Total		**$20,011,009**	**$7,000,000**	**$846,846**	**$1,749,993**	**$589,421**	**$708,317**	**$1,020,287**	**$705,535**	**$2,538,283**	**$809,216**	**$1,190,085**	**$904,805**	**$393,987**	**$895,617**	**$265,167**	**$393,450**	
	Grand Total	**3117**																	
	Total area tributary to the trunk line segment			3117	1007	2030	640	400	600	240	1095	1095	940	433	273	352	367	540	2552

	TRUNK LINE DESCRIPTIONS														
	B	C1	E	F	G1	G2	H1	I	J	K	L	M	N	O	P	A
	E. Elwood / 159th Ave.	Loop 303/El Cidro	S. Cotton	E. Lower Buckeye	Citrus / L. Buckeye	W. Lower Buckeye	S. Citrus	N. Cotton	E. Yuma	W. Yuma	N. Citrus	N. Citrus (Las Palmas)	183rd Ave. & Yuma	S. Citrus	Las Brisas	159th Ave (Bottleneck)
Total Con. Costs	$7,000,000	$846,846	$1,749,993	$589,421	$708,317	$1,020,287	$705,535	$2,538,283	$809,216	$1,190,085	$904,805	$393,987	$895,617	$265,167	$393,450	

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4.0 REFERENCES

1. "Engineering Design Standards and Policies Manual," City of Goodyear, Arizona.

2. Title 18, Chapter 9, Article 3 – Part E General Permits. January 7, 2005. From Arizona Revised Statutes.

3. Integrated Water Master Plan for City of Goodyear, Black & Veatch, June 2008.

4. "West Goodyear Central Planning Area Master Wastewater Study Update," report prepared by CVL, dated June 2006.